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## **Acknowledgement**

The field data contained in these reports was collected by the combined efforts of the Casper Region Wildlife Division personnel including District Wildlife Biologists, District Game Wardens, the Wildlife Technicians, the Habitat Biologist, the Wildlife Management Coordinator and Region Supervisor, and other Department personnel and volunteers working at check stations. CWD technicians were responsible for collecting CWD samples from hunter-harvested deer and elk throughout the Region. The authors wish to express their appreciation to all those who assisted in data collection.

## 2012 - JCR Evaluation Form

SPECIES: Pronghorn

PERIOD: 6/1/2012 - 5/31/2013

HERD: PR740 - CHEYENNE RIVER

HUNT AREAS: 4-9, 27, 29

PREPARED BY: JOE SANDRINI

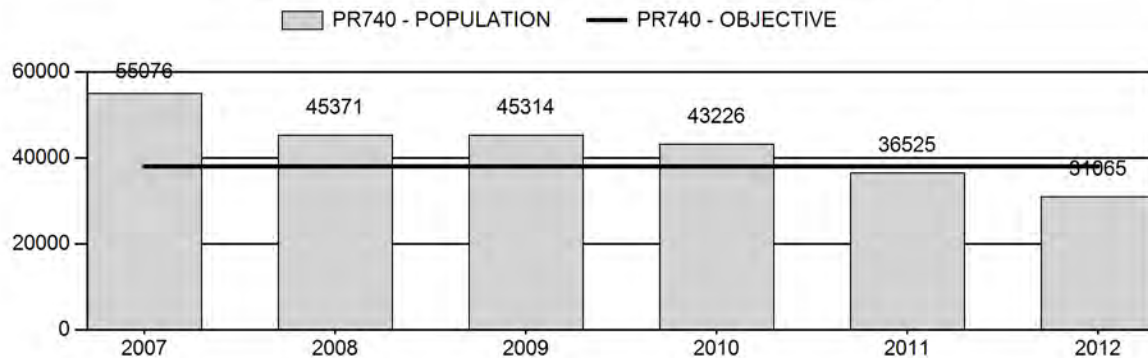
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	45,102	31,065	33,120
Harvest:	6,290	4,269	3,785
Hunters:	6,523	4,826	4,250
Hunter Success:	96%	88%	89%
Active Licenses:	7,198	5,184	4,560
Active License Percent:	87%	82%	83%
Recreation Days:	22,295	19,330	17,000
Days Per Animal:	3.5	4.5	4.5
Males per 100 Females	57	44	
Juveniles per 100 Females	62	63	

Population Objective: 38,000  
 Management Strategy: Recreational  
 Percent population is above (+) or below (-) objective: -18.2%  
 Number of years population has been + or - objective in recent trend: 2  
 Model Date: 04/09/2013

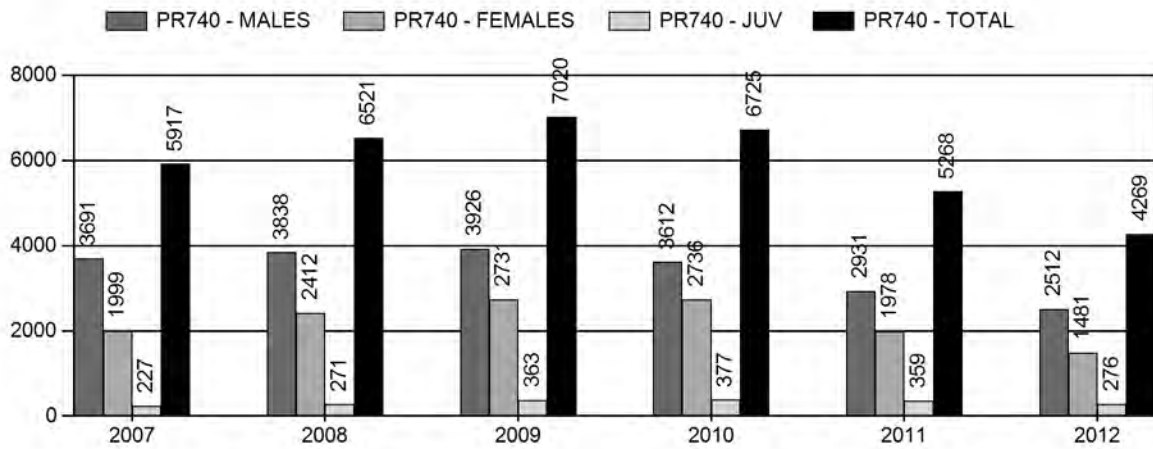
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq$ 1 year old:	9.6%	7.5%
Males $\geq$ 1 year old:	34.0%	29.0%
Juveniles (< 1 year old):	2.8%	2.3%
Total:	13.0%	11.2%
Proposed change in post-season population:	-15.0%	+6.5%

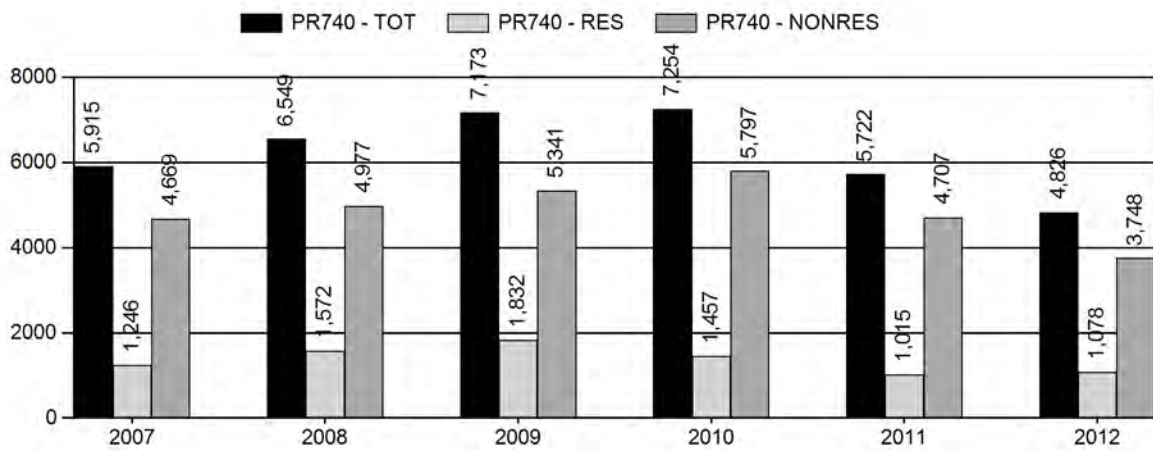
## Population Size - Postseason



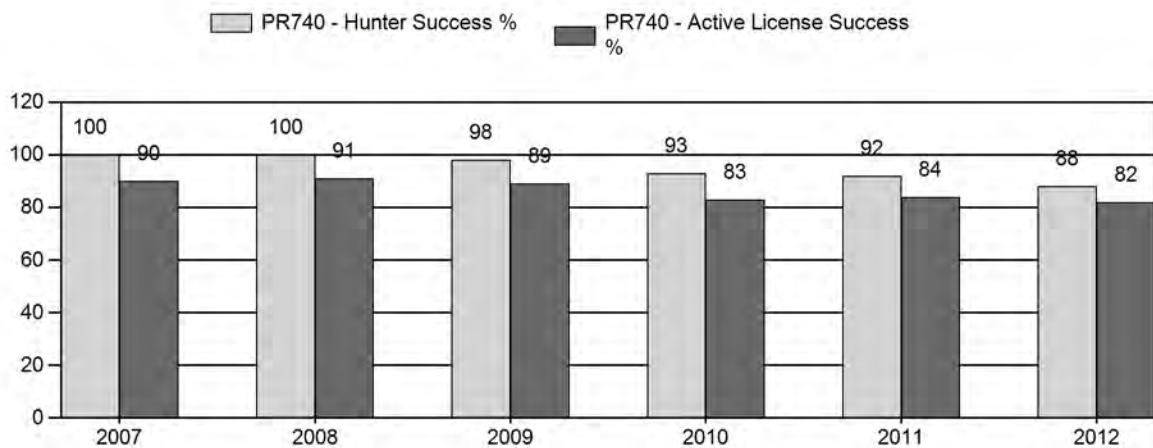
## Harvest



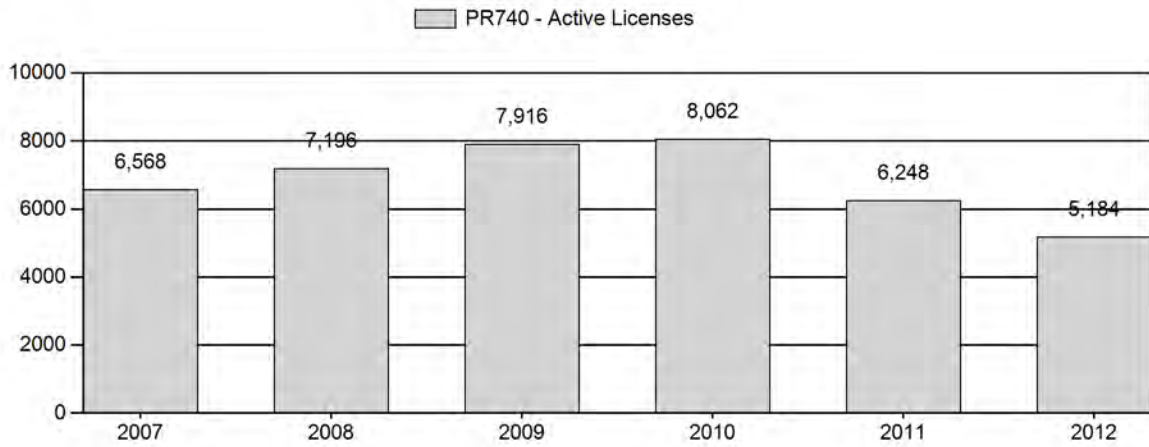
## Number of Hunters



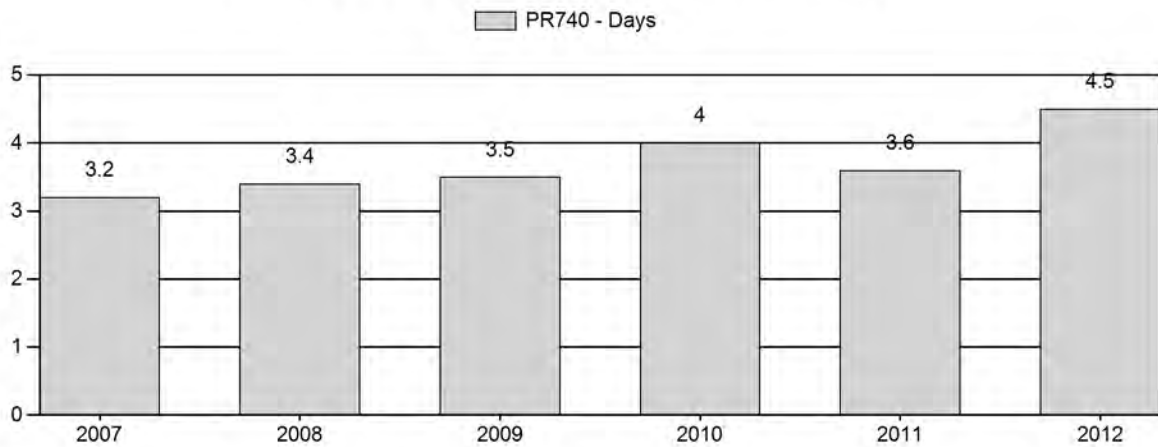
## Harvest Success



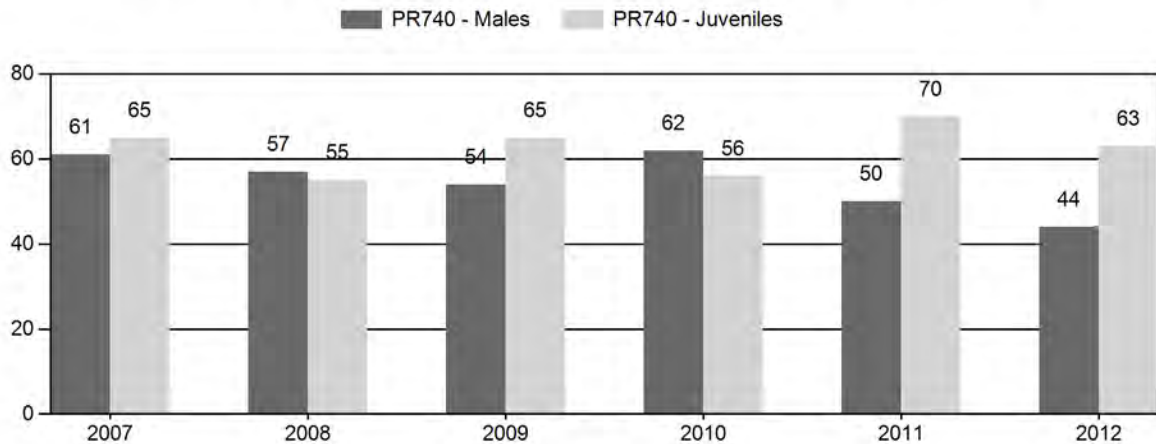
## Active Licenses



## Days Per Animal Harvested



## Preseason Animals per 100 Females



## 2007 - 2012 Preseason Classification Summary

for Pronghorn Herd PR740 - CHEYENNE RIVER

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	61,548	515	772	1,287	27%	2,103	44%	1,362	29%	4,752	2,513	24	37	61	± 3	65	± 4	40
2008	52,544	601	1,081	1,682	27%	2,950	47%	1,630	26%	6,262	1,982	20	37	57	± 3	55	± 3	35
2009	53,036	395	1,101	1,496	25%	2,757	46%	1,802	30%	6,055	2,429	14	40	54	± 3	65	± 3	42
2010	50,623	411	1,054	1,465	29%	2,345	46%	1,309	26%	5,119	2,261	18	45	62	± 3	56	± 3	34
2011	42,320	208	695	903	23%	1,796	45%	1,258	32%	3,957	2,624	12	39	50	± 3	70	± 4	47
2012	35,760	202	462	664	21%	1,513	48%	960	31%	3,137	2,156	13	31	44	± 3	63	± 4	44

**2013 HUNTING SEASONS  
CHEYENNE RIVER PRONGHORN HERD (PR740)**

Hunt Area	Type	Season Dates		Quota	Limitations
		Opens	Closes		
4	1	Oct. 1	Nov. 20	100	Limited quota licenses; any antelope
	6	Oct. 1	Nov. 20	25	Limited quota licenses; doe or fawn
5	1	Oct. 1	Nov. 20	100	Limited quota licenses; any antelope
	6	Oct. 1	Nov. 20	50	Limited quota licenses; doe or fawn valid on private land
6	1	Oct. 1	Oct. 15	350	Limited quota licenses; any antelope
7	1	Oct. 1	Oct. 15	350	Limited quota licenses; any antelope
	6	Oct. 1	Oct. 15	25	Limited quota licenses; doe or fawn
8	1	Oct. 1	Oct. 15	450	Limited quota licenses; any antelope
9	1	Oct. 1	Oct. 31	700	Limited quota licenses; any antelope; also valid in that portion of Area 11 in Converse or Niobrara counties
	6	Oct. 1	Oct. 31	1,250	Limited quota licenses; doe or fawn; also valid in that portion of Area 11 in Converse or Niobrara counties
27	1	Oct. 1	Oct. 15	400	Limited quota licenses; any antelope
	6	Oct. 1	Oct. 15	150	Limited quota licenses; doe or fawn
29	1	Oct. 1	Oct. 15	150	Limited quota licenses; any antelope
	2	Oct. 1	Oct. 15	550	Limited quota licenses; any antelope valid on private land
	6	Oct. 1	Oct. 15	200	Limited quota licenses; doe or fawn valid on private land
	7	Oct. 1	Nov. 15	200	Limited quota licenses; doe or fawn valid south and west of Interstate Highway 25

- continued -

Hunt Area	Type	Season Dates		Quota	Limitations
		Opens	Closes		
Archery 4 & 5		Sept. 1	Sept. 30		Refer to license type and limitations in Section 3.
Archery 6 - 9, 27 & 29		Aug. 15	Sept. 30		Refer to license type and limitations in Section 3.

### SUMMARY OF PROPOSED CHANGES IN LICENSE NUMBER

Hunt Area	License Type	Quota change from 2012
6	6	-25
7	7	-25
8	6	-50
27	1	-100
27	6	-50
29	1	-650
29	2	+550
29	6	-350
<b>Herd Unit Total</b>	<b>1</b>	<b>-750</b>
	<b>2</b>	<b>+550</b>
	<b>6</b>	<b>-475</b>
	<b>7</b>	<b>-25</b>

#### Management Evaluation

**Current Management Objective: 38,000**

**Management Strategy: Recreational**

**2012 Postseason Population Estimate: ~ 31,000**

**2013 Proposed Postseason Population Estimate: ~ 33,100**

**HERD UNIT ISSUES:** The management objective of the Cheyenne River Pronghorn Herd Unit is for an estimated post-season population of 38,000 pronghorn. This herd is managed under the recreational management strategy. The population objective and management strategy were set in 1999 when this herd was created by combining the South Black Hills and Thunder Basin Pronghorn Herd Units. The objective is slated for review and possible revision during bio-year 2013.

The Cheyenne River Pronghorn herd unit encompasses much of northeastern Wyoming. Because of the disparity of habitats across the herd unit and the preponderance of private land, this herd unit is managed for recreational hunting. The herd unit encompasses 7,466 mi<sup>2</sup>, of



which 6,443 mi<sup>2</sup> is considered occupied pronghorn habitat. Most of the unoccupied habitat is found in Hunt Areas (HA) 4 and 5, which include a portion of the Black Hills having topographical and vegetative features unsuitable for pronghorn. Approximately 77% of this herd unit is private land. The remaining 23% includes lands managed by the United States Forest Service (USFS), the Bureau of Land Management (BLM), and the State of Wyoming. Most of the USFS lands are part of the Thunder Basin National Grassland (TBNG) and located in Hunt Areas 5, 6, 7, 27, and 29. The State of Wyoming owns a large parcel of land in Hunt Area 9. Remaining public lands are scattered throughout the herd unit, and most are accessible only by crossing private lands. Access fees for hunting are common on private land, and many landowners have leased their property to outfitters. Therefore, accessible public lands are subjected to heavy hunting pressure.

Major land uses in this herd unit include livestock grazing, oil and gas production, timber harvest, and farming. There are several oil and gas fields which occur primarily in Hunt Areas 6, 7, 8, and 29, and development pressure has increased in recent years in Hunt Areas 8 and 29. Two surface coal mines represent a substantial land use within Hunt Area 27. Farming generally occurs in the southern most portion of the herd unit, but there are a number of wheat, oat, and alfalfa fields near Sundance and Upton. When pronghorn numbers are high, damage to growing alfalfa can become an issue.

**WEATHER:** The winter of 2010-11 was very harsh in the northern half of the herd unit, and the 2012 summer was the driest on record. Over-winter mortality was well above average in bio-year 2010, and losses of all ages of pronghorn continued into the spring. The warm, dry conditions that beset the area during the end of bio-year 2011 continued through the 2012-13 winter. April of 2013 finally saw a break in the drought when temperatures dropped below normal for the entire month, and significant precipitation was again received (<http://www.ncdc.noaa.gov/temp-and-precip/>). Overall, the weather pattern during bio-year 2012 resulted in poor forage production, reduced recruitment, and average over-winter survival of all age classes of pronghorn. Tougher winter and spring conditions since 2008 combined with the recent dry summer have likely reduced fawn productivity and survival the past five years. Until recently, hunting seasons have been designed to reduce pronghorn numbers, and harvest along with reduced recruitment and the severe 2010-11 winter have all contributed this population's decline.

**HABITAT:** This herd unit is dominated by Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), silver sagebrush (*Artemisia cana*), and mid-prairie grasses such as wheatgrasses (*Agropyron* spp.), grama grasses (*Bouteloua* spp.), and needle grasses (*Stipa* spp.). In addition, there are several major drainages within occupied habitat dominated by plains cottonwood (*Populus deltoides*) and greasewood (*Sarcobatus vermiculatus*). These drainages include the Cheyenne River, Antelope Creek, Black Thunder Creek, Beaver Creek, Old Woman Creek, Hat Creek, and Lance Creek. Steep canyons dominate the southern Black Hills portion of the herd unit, and there vegetation consists of ponderosa pine (*Pinus ponderosa*) and its associated savannah. Some areas are dominated by agricultural croplands, notably near the towns of Douglas, Lusk, Upton, and Sundance.

Habitat suitability for pronghorn varies greatly throughout the herd unit. Much of the habitat in the northeast portion of the herd unit is marginal, consisting of topography and vegetation not particularly suitable for pronghorn. The west-central portions of the herd unit represent the best block of contiguous sagebrush habitat. While the eastern and southern sections of the herd unit are dominated more by mid-grass prairie and agricultural lands, but locally do support good numbers of pronghorn. Habitat disturbance throughout the herd unit is generally high. There are a number of developed oil fields and areas impacted by bentonite and coal mining. In the central and southern portions of the herd unit, historic brush control projects have decreased the amount of sagebrush available for wintering pronghorn at many sites, yet pronghorn still winter in this region. Habitat loss and fragmentation is expected to continue and negatively impact this herd. Based upon current exploration and leasing trends, the amount of disturbance caused by oil and gas activities will continue to increase in Hunt Areas 8 and 29. In addition, a large wind farm is planned in Hunt Area 29.

Beginning in the fall of 2001, Department personnel established Wyoming big sagebrush monitoring transects within the herd unit. Forage conditions away from irrigated fields within this herd unit were poor between 2001 and 2004, improved substantially in 2005, and then declined dramatically during 2006, when severe drought plagued the herd unit. Based on these transects, forage conditions rebounded in 2007, and remained good in 2008 and 2009. Leader production measurements were suspended in 2010, but over-winter estimates of use have continued. As previously mentioned, sagebrush leader growth improved in 2007, however, the post-season population of this herd peaked that year and winter use of sagebrush leaders was excessive.<sup>1</sup> It was apparent the population of pronghorn and other animals browsing sagebrush at that time was not sustainable. Increased harvest along with reduced recruitment and survival began to push this pronghorn population down; and, as this herd declined, winter use of sagebrush dropped and range conditions improved through 2011. Then, the severe drought of 2012 resulted in very poor forage production and elevated use during and after the growing season.

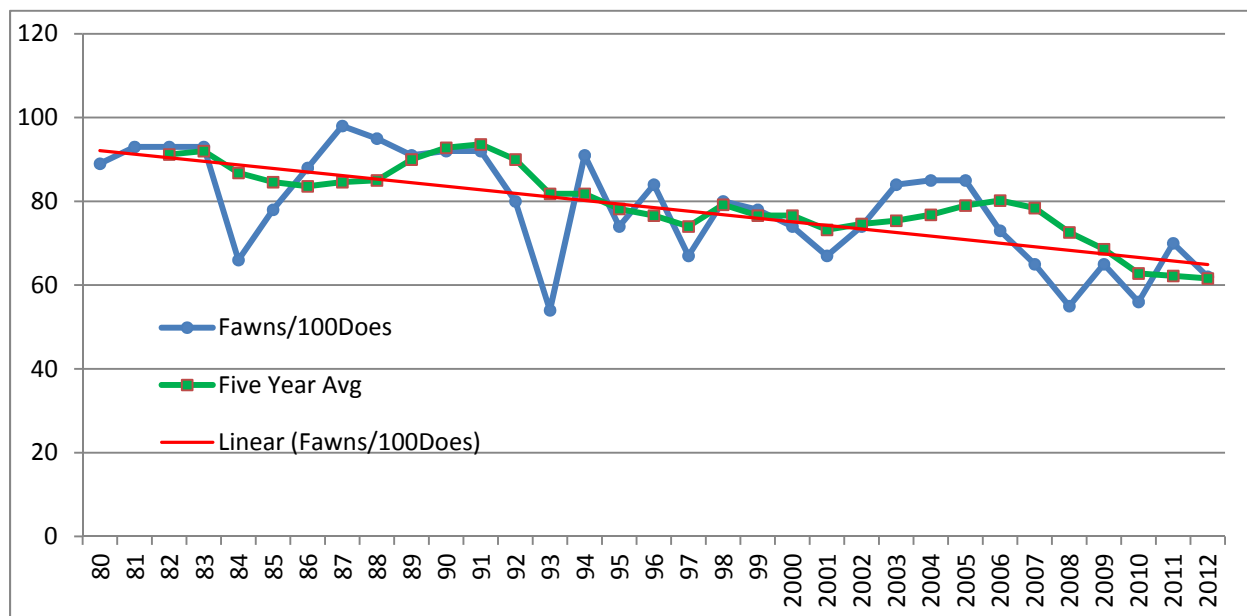
**FIELD DATA:** This population's recent decline was accentuated during the winter of 2010-2011, which was very severe in the northern half of the herd unit and tough in other locations as well. During this winter, large scale movements of pronghorn and increased mortality were observed. However, the winters of 2011-2012 and 2012-13 were generally mild. Weather during the 2012 bio-year has been extremely dry and warmer than normal, and it was the driest on record in many areas. Drought this bio-year appears to have negatively impacted fawn survival, as the fawn:doe ratio decreased to 62:100 from the 70:100 observed in 2011. The 2012 observed value is equal to the mean observed since 2007, and 14% below the longer-term average of 72:100.

It appears over the last 30 years annual productivity of this herd, as measured by pre-season fawn:doe ratios, has generally declined (Figure 1). This is thought to be the result of a reduction in habitat quantity and quality, intensified by drought, succession and aging of sagebrush, and over-browsing from both domestic livestock and wildlife. However, productivity was fairly stable and generally good between 1998 and 2006 (*avg.* 78; *std. dev.* 6.3). A situation credited to mild winters persisting during intensifying drought, even though this population was estimated to be above objective most years. However, as this population moved more significantly above

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<sup>1</sup> Different technique applied to measure utilization in 2007. Results may not be directly comparable to previous years.

objective beginning in 2005 and drought continued, fawn:doe ratios began to decline. This trend continued even with the alleviation of drought in 2008 and the advent of a declining population. During this time frame severe snow storms plagued the herd unit each April and May. In addition, June weather each year was cooler and wetter than normal. This combination is believed to have increased post-season mortality of adults and reduced survival of fawns. Predation of fawns may have also increased during this time as well, as small animal populations dropped throughout the herd unit. As a result, since 2007 the herd's preseason fawn:doe has averaged only 62 fawns per 100 does (*std. dev* 5.7).



**Figure 1: Observed Annual, and Recent Five-Year Average Fawn:Doe Ratios in the Cheyenne River Pronghorn herd unit (1980-2012).**

As this population rose between 2002 and 2007, preseason buck:doe ratios fluctuated, but generally increased. Since 2007, preseason buck:doe ratios have declined. The population model simulates an increase in buck ratios from 46:100 in 2002 to a peak of 61:100 in 2007, with a subsequent decline back to 47:100. It should be noted the accuracy of the observed buck:doe ratio in both 2006 & 2007 was probably better than those observed between 2002 and 2005, when the observed ratio fluctuated between 45:100 and 65:100 annually. During the preceding decade, observed buck:doe ratios were much more consistent, and averaged about 53:100.

Small changes in female mortality rates can greatly affect observed male:female ratios (Bender 2006). Fluctuations in observed buck:doe ratios may have been influenced more by female survival than total buck numbers, at least in hunt areas where we have no difficulty increasing doe harvest, such as Areas 27 and portions of Areas 7 & 29. This may explain the wide variation in observed buck:doe ratios within the herd unit between some years. As Bender (2006) states, managers should consider the significant influence small changes in female mortality rates have on observed male:female ratios when managing male escapement from harvest in ungulate populations.

**HARVEST DATA:** Harvest success in this herd unit increased between 2002 and 2007 and effort declined as the population grew. In 2008, success again rose slightly, but effort increased as well. Since then, hunter success has dropped and effort has continued to increase. In 2012, several hunt areas exhibited low success and high effort compared to other pronghorn hunt areas in the state and within this herd unit. Hunt Areas 4, 5, 8, & 29 had an average active license success of 67% on doe/fawn tags, while type 1 active license success averaged 69% in areas 4, 5, & 27. Other hunt areas exhibited success values closer to those generally expected for pronghorn. Herd unit wide, active license success was just below 80% on doe/fawn tags and was about 85% with type 1 licenses. Although hunter success has dropped recently, the hunter satisfaction survey revealed herd unit-wide 40% of hunters were very satisfied and 37% were satisfied with their hunt last fall.

**POPULATION:** The 2012 post-season population estimate of this herd was about 31,000 with the population trending downwards, after peaking at an estimated 55,000 pronghorn in 2007. The last line transect (LT) survey conducted in this herd unit was in June 2011, and resulted in an end of 2010 bio-year population estimate of 30,900. Another LT is scheduled for June, 2013.

This population was generally stable and near objective between 1993 and 2002. The population then increased through 2007 as fawn survival was good, and observed preseason fawn:doe ratios averaged 80:100 from 2002 through 2006. This, coupled with our inability to sell all doe/fawn licenses, made controlling the population difficult. Since then, a reduction in price of doe/fawn licenses, the ability for hunters to possess up to four of them, internet license sales, and enrollment of private lands in our PLPW program have substantially improved doe/fawn harvest. This population has dropped steadily since 2007, in the wake of increased female harvest through 2009 and continued, lower fawn survival.

The “Time Specific Juvenile – Constant Adult Survival” (TSJ CA) spreadsheet model was chosen to estimate this herd’s population. The three competing models considered had relatively similar AICc values and tracked observed trends in this population well. The TSJ CA model was chosen because it aligned better with recent LT estimates. It also produced a 2012 post-season population estimate between other competing models. All three models simulate a population rise between 2002 and 2007, followed by a decline. These trends dovetail well with harvest statistics and the perceptions of local game managers, landowners, and hunters. The current model is considered to be of good quality because it has 15<sup>+</sup> years of data; ratio data are available for all years in the model; juvenile and adult survival data were obtained from similar herds; it aligns fairly well with observed data; and results are biologically defensible.

**MANAGEMENT SUMMARY:** The 2012 hunting season was conservative in this herd unit, and changes for the 2013 season entail fostering this strategy. We are continuing to reduce doe/fawn harvest in the central portion of the herd unit, where pronghorn numbers remain notably depressed. A relatively greater reduction in doe/fawn harvest is being carried forth in the northern two-thirds of Hunt Area 29, where landowners are complaining about low pronghorn numbers. Additionally, a new strategy is being implemented in Hunt Area 29 to reduce severe hunter crowding and over-harvest on the small portion of public land available, primarily Thunder Basin National Grasslands. This entails issuing a type 2 license valid on private land only, and restricting validity of type 6 tags to private land as well. In addition, harvest of bucks

is being reduced about 20% in area 27, an area where residents hold 80% of the licenses. Here, active type 1 license success has dropped below 80%, and the percentage of residents reporting they were satisfied or very satisfied fell from 89% in 2011 to 64% in 2012. Finally, in the southern third of the herd unit, harvest levels will remain steady to address damage issues near Lusk and south of Douglas.

Given average survival and recruitment rates observed over the past five years, together with a predicted harvest of 3,785 pronghorn, changes in the hunting season structure should allow this population to grow about 6%, to 33,100 post-season in 2013.

#### **LITERATURE CITED:**

Bender, Louis C. 2006. Uses of herd composition and age ratios in ungulate management. Wildlife Society Bulletin. Vol. 34 (4): 1225-1230.

INPUT

Species:  
Pronghorn

Biologist:  
Joe Sandrini

Herd Unit & No.:  
Cheyenne River

Model date:  
02/14/12

MODELS SUMMARY			Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	Constant Juvenile & Adult Survival		162	171	<input type="checkbox"/> CJ,CA Model	<div><input checked="" type="checkbox"/> SCJ,SCA</div> <div><input checked="" type="checkbox"/> TSJ,CA Model</div>
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival		126	152	<input type="checkbox"/> SCJ,SCA	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival		68	173	<input checked="" type="checkbox"/> TSJ,CA Model	

Population Estimates from Top Model													
Year	Predicted Prehunt Population (year t)			Predicted Posthunt Population (year t)			Predicted adult End-of-bio-year Pop (year t)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females	Juveniles	Total Males	Females	Total Males	Females	Total Adults	Field Est	Field SE		
1993	10884	12460	20094	10720	9801	18799	10152	18013	28165				38000
1994	16137	9949	17653	15984	6679	16382	9331	17900	27231				38000
1995	12990	9145	17542	12681	5983	15785	10330	18879	29209				38000
1996	15519	10124	18502	15432	7002	17493	9377	18633	28010				38000
1997	12275	9189	18260	12203	6290	17307	9255	18928	28182				38000
1998	14767	9070	18549	14685	6504	17990	10556	20636	31192				38000
1999	15772	10345	20224	15660	7888	19532	11245	21418	32663				38000
2000	15435	11020	20989	15323	8399	20265	9756	20140	29897				38000
2001	13172	9561	19737	13079	7475	19250	8613	18868	27482	25386	4403		38000
2002	13621	8441	18491	13552	6182	18148	11066	21538	32604	26285	4595		38000
2003	17781	10845	21107	17647	8289	20317	10142	20640	30782				38000
2004	17186	9939	20227	17061	7235	19465	13491	24190	37681				38000
2005	20098	13221	23706	19941	10584	22802	15342	25995	41336				38000
2006	18714	15035	25475	18567	11820	24170	17023	27818	44840				38000
2007	17656	16682	27261	17406	12622	25063	14406	25270	39677				38000
2008	13694	14118	24765	13386	9896	22112	13787	24409	38196	38196	4139		38000
2009	15635	13511	23921	15236	9192	20917	14018	24181	38199				38000
2010	13228	13738	23697	12813	9764	20687	10075	19497	29572	30919	4265		38000
2011	13394	9873	19107	12989	6649	16932	8278	17260	25539				38000
2012	10733	8113	16915	10429	5349	15286	9154	17915	27069				38000
2013	10757	8971	17557	10509	6375	16237							38000
2014													
2015													
2016													
2017													
2018													
2019													
2020													
2021													
2022													
2023													
2024													
2025													

Survival and Initial Population Estimates					
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est
1993	0.43			0.83	
1994	0.52			0.83	
1995	0.90			0.83	
1996	0.51			0.83	
1997	0.71			0.83	
1998	0.73			0.83	
1999	0.63			0.83	
2000	0.40			0.83	
2001	0.40			0.83	
2002	0.90			0.83	
2003	0.40			0.83	
2004	0.90			0.83	
2005	0.67			0.83	
2006	0.80			0.83	
2007	0.50			0.83	
2008	0.90			0.83	
2009	0.90			0.83	
2010	0.40			0.83	
2011	0.40			0.83	
2012	0.90			0.83	
2013	0.00			0.83	
2014					
2015					
2016					
2017					
2018					
2019					
2020					
2021					
2022					
2023					
2024					
2025					

**Parameters:**

Adult Survival =	0.830
Initial Total Male Pop/10,000 =	1,246
Initial Female Pop/10,000 =	2,009

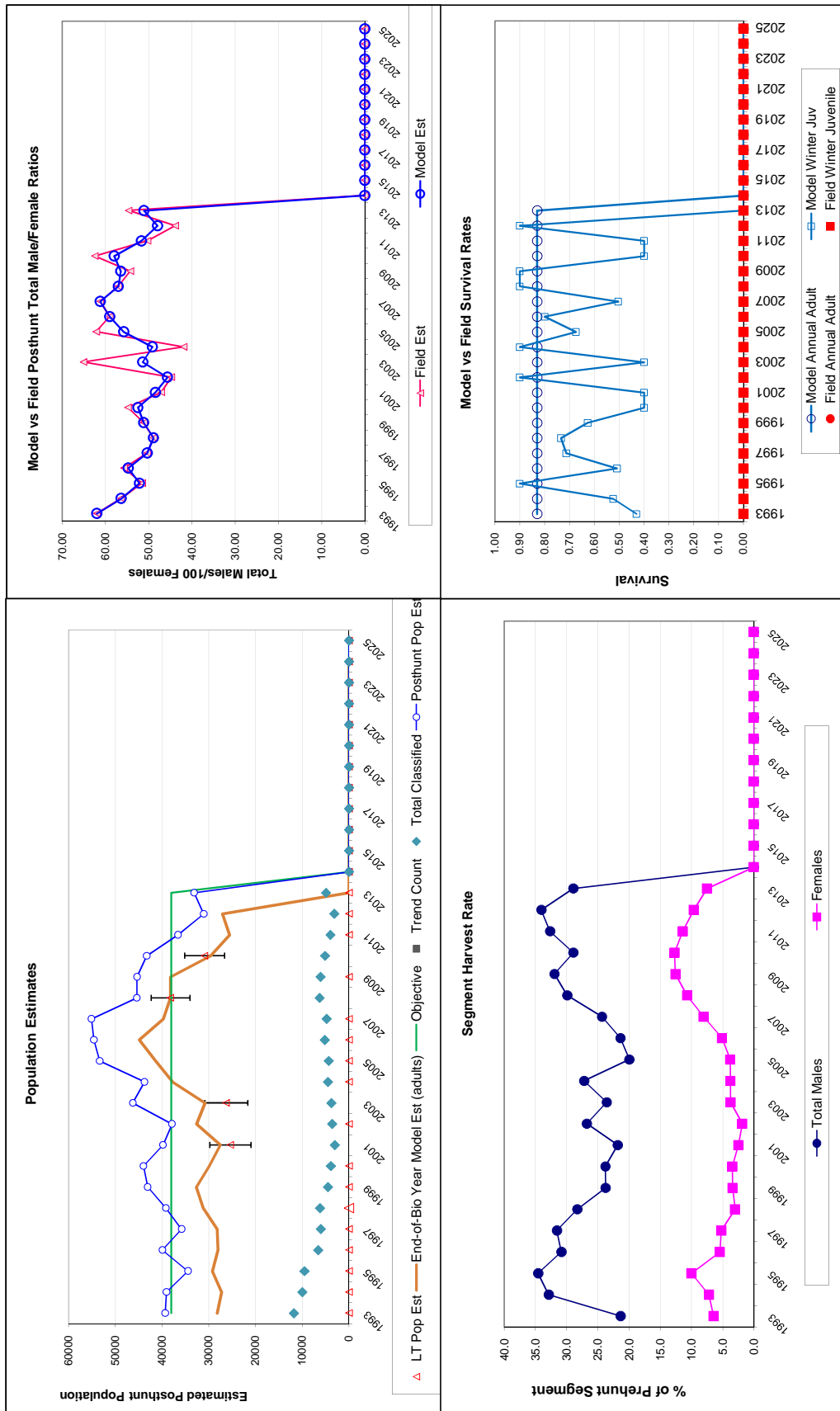
**MODEL ASSUMPTIONS**

Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult survival	98%

Classification Counts										Harvest		
Year	Juvenile/Female Ratio			Total Male/Female Ratio			Segment Harvest Rate (% of					
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Juv	Males	Females	Total Harvest	Total Males	Females
1993		54.16	1.24	62.01	62.01	1.36	2418	1178	149	3745	21.3	6.4
1994		91.41	2.09	56.36	56.36	1.48	2973	1155	139	4267	32.9	7.2
1995		74.05	1.75	52.13	51.52	1.36	2874	1597	281	4752	34.6	10.0
1996		83.88	2.37	54.72	55.73	1.78	2838	917	79	3834	30.8	5.5
1997		67.22	2.02	50.33	50.33	1.65	2636	866	65	3567	31.6	5.2
1998		79.61	2.30	48.90	48.89	1.64	2332	508	74	2914	28.3	3.0
1999		77.99	2.67	51.15	51.15	1.99	2234	629	102	2965	23.8	3.4
2000		73.54	2.75	52.50	54.81	2.24	2383	658	102	3143	23.8	3.4
2001		66.74	2.82	48.44	47.08	2.22	1897	443	85	2425	21.8	2.5
2002		73.66	2.79	45.65	44.77	1.99	2054	312	63	2429	26.8	1.9
2003		84.24	3.21	51.38	65.09	2.67	2324	718	122	3164	23.6	3.7
2004		84.96	2.82	49.14	41.93	1.73	2458	693	114	3265	27.2	3.8
2005		84.78	3.00	55.77	62.15	2.41	2397	822	143	3362	19.9	3.8
2006		73.46	2.39	59.02	59.02	2.05	2922	1186	133	4241	21.4	5.1
2007		64.76	2.25	61.19	61.20	2.17	3691	1999	227	5917	24.3	8.1
2008		55.25	1.71	57.01	57.02	1.74	3838	2412	271	6521	29.9	10.7
2009		65.36	1.98	56.48	54.26	1.74	3926	2731	363	7020	32.0	12.6
2010		55.82	1.93	57.97	62.47	2.08	3612	2736	377	6725	28.9	12.7
2011		70.04	2.58	51.67	50.28	2.05	2931	1978	359	5268	32.7	11.4
2012		63.45	2.62	47.96	43.89	2.04	2512	1481	1481	4269	34.1	9.6
2013		61.27	2.09	51.10	54.67	1.93	2360	1200	1200	3785	28.9	7.5
2014												
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												



FIGURES



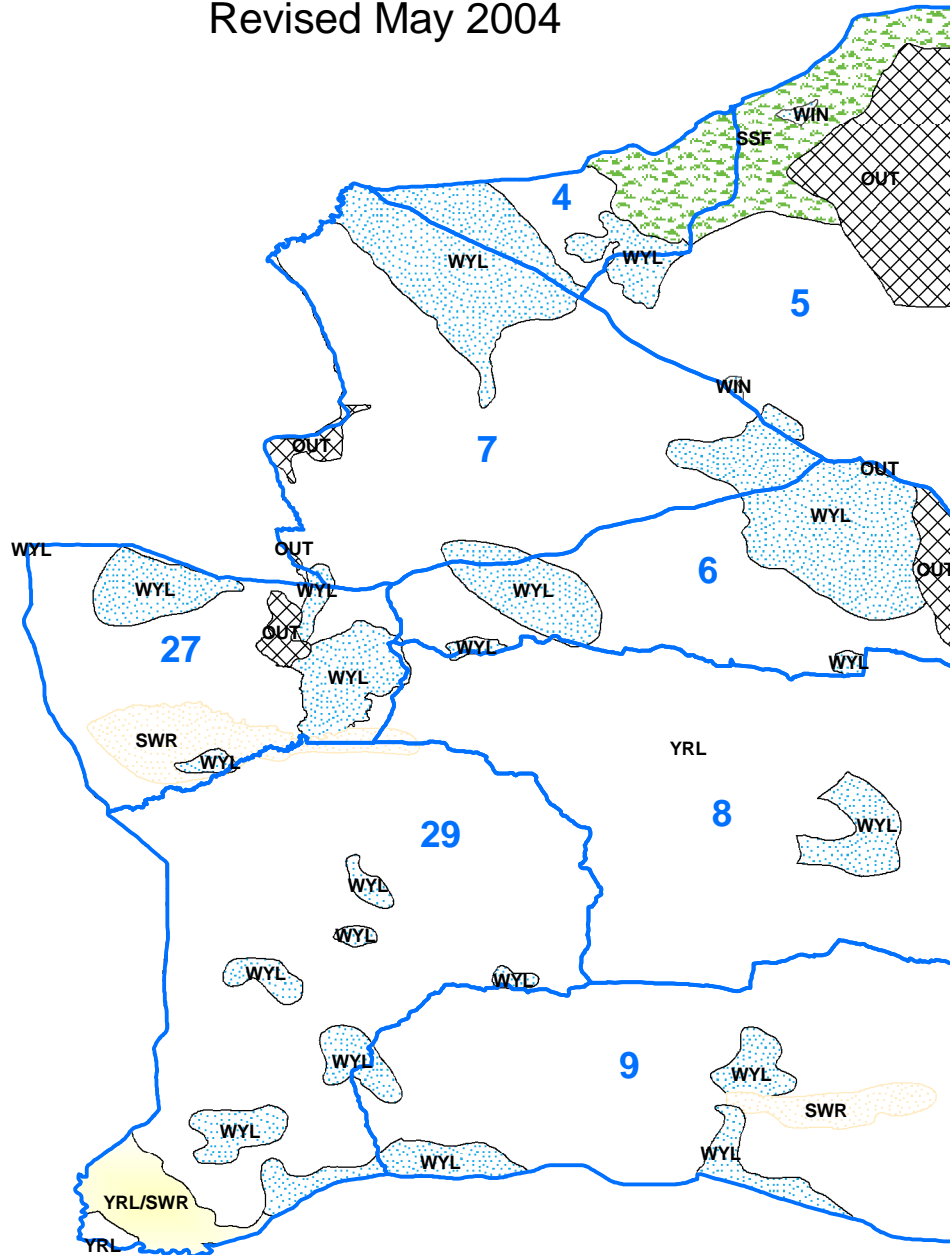
Comments:

# Pronghorn - Cheyenne River

Hunt Areas 4, 5, 6, 7, 8, 9, 27, & 29

Casper Region

Revised May 2004



## 2012 - JCR Evaluation Form

SPECIES: Pronghorn

PERIOD: 6/1/2012 - 5/31/2013

HERD: PR745 - RATTLESNAKE

HUNT AREAS: 70-72

PREPARED BY: HEATHER  
O'BRIEN

	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	14,407	8,404	8,559
Harvest:	2,491	1,763	1,310
Hunters:	2,534	1,955	1,450
Hunter Success:	98%	90%	90%
Active Licenses:	2,755	2,154	1,500
Active License Percent:	90%	82%	87%
Recreation Days:	7,698	6,349	4,000
Days Per Animal:	3.1	3.6	3.1
Males per 100 Females	62	44	
Juveniles per 100 Females	54	43	

Population Objective:	12,000
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-30.0%
Number of years population has been + or - objective in recent trend:	2
Model Date:	2/28/2013

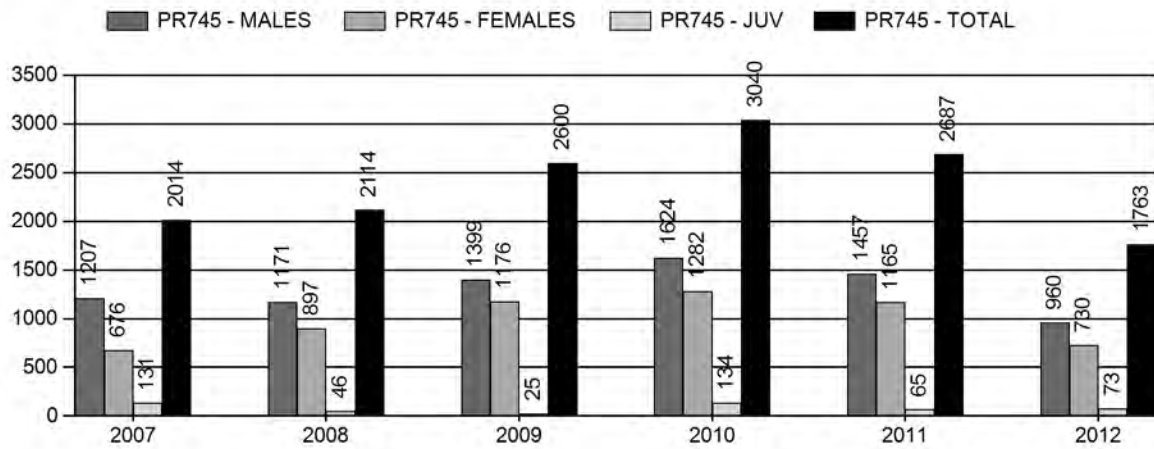
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq$ 1 year old:	14.8%	6.2%
Males $\geq$ 1 year old:	40.7%	31.0%
Juveniles (< 1 year old):	0.7%	1.7%
Total:	17.0%	10.2%
Proposed change in post-season population:	-18.7%	-11.2%

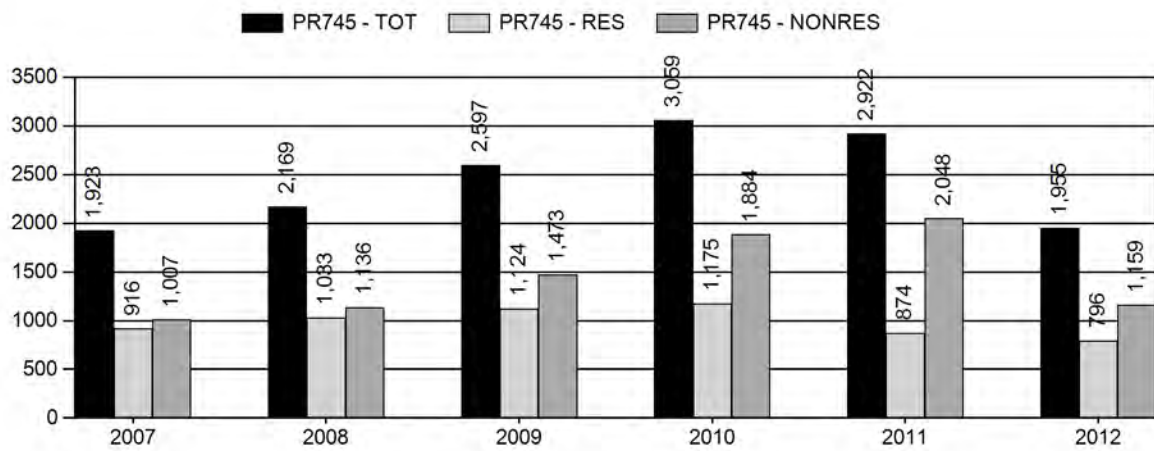
## Population Size - Postseason



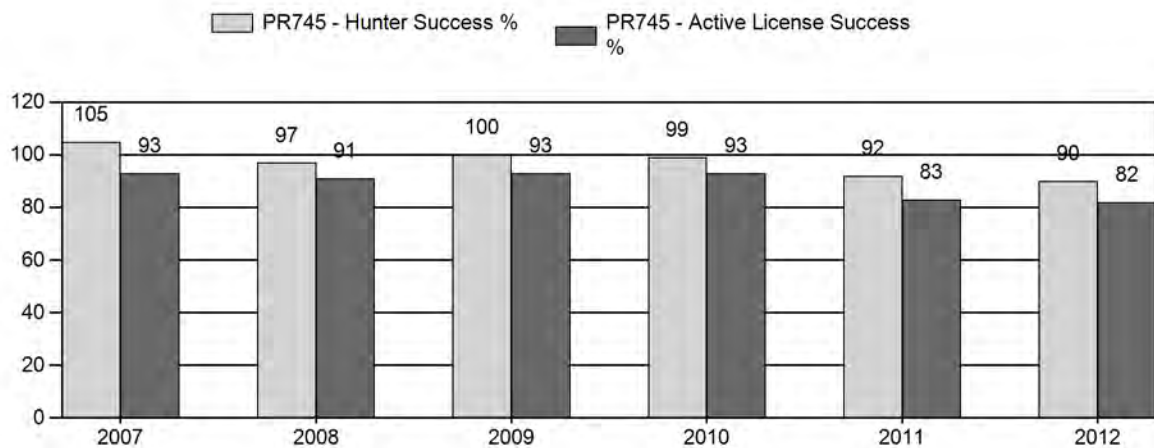
## Harvest



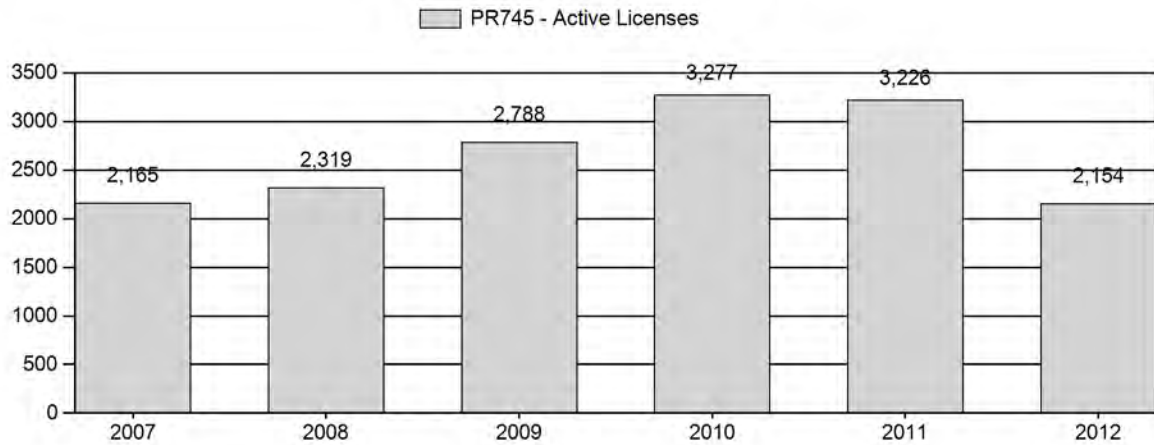
## Number of Hunters



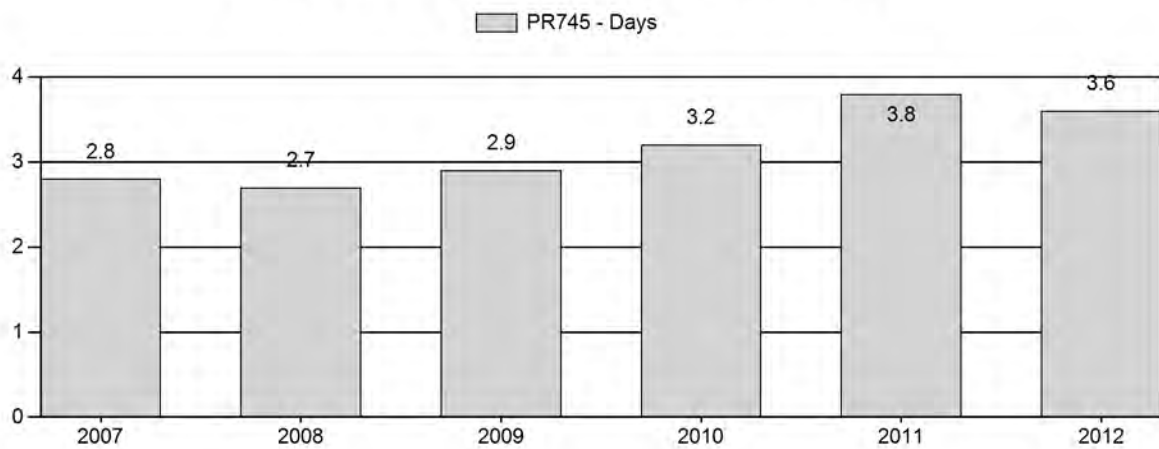
## Harvest Success



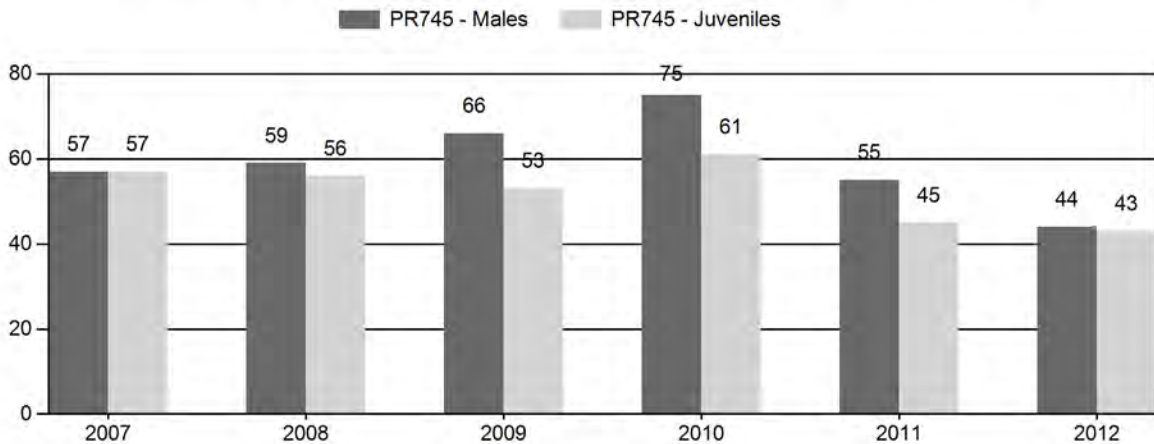
## Active Licenses



## Days Per Animal Harvested



## Preseason Animals per 100 Females



**2007 - 2012 Preseason Classification Summary**

for Pronghorn Herd PR745 - RATTLESNAKE

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	18,120	381	663	1,044	27%	1,836	47%	1,050	27%	3,930	0	21	36	57	± 3	57	± 3	36
2008	18,407	434	823	1,257	28%	2,114	46%	1,183	26%	4,554	0	21	39	59	± 3	56	± 3	35
2009	18,269	330	954	1,284	30%	1,951	46%	1,027	24%	4,262	0	17	49	66	± 3	53	± 3	32
2010	18,033	271	933	1,204	32%	1,599	42%	970	26%	3,773	0	17	58	75	± 4	61	± 4	35
2011	12,938	195	683	878	27%	1,607	50%	721	22%	3,206	0	12	43	55	± 3	45	± 3	29
2012	10,343	82	209	291	24%	662	53%	285	23%	1,238	0	12	32	44	± 5	43	± 5	30

**2013 HUNTING SEASONS  
RATTLESNAKE PRONGHORN HERD (PR745)**

Hunt Area	Type	Date of Seasons		Quota	Limitations
		Opens	Closes		
70	1	Sept. 15	Oct. 31	200	Limited quota licenses; any antelope
	6	Sept. 15	Nov. 30	200	Limited quota licenses; doe or fawn antelope
71	1	Sept. 15	Oct. 31	200	Limited quota licenses; any antelope
	6	Sept. 15	Oct. 31	100	Limited quota licenses; doe or fawn antelope
72	1	Sept. 15	Oct. 31	600	Limited quota licenses; any antelope
	6	Sept. 15	Oct. 31	200	Limited quota licenses; doe or fawn antelope
Archery		Aug. 15	Sept. 14		Refer to license type and limitations in Section 3

Hunt Area	Type	Quota change from 2012
70	1	0
	6	0
71	1	-100
	6	-200
72	1	-200
	6	-400
Total	1	-300
	6	-600

**Management Evaluation**

**Current Postseason Population Management Objective:** 12,000

**Management Strategy:** Special

**2012 Postseason Population Estimate:** ~8,400

**2013 Proposed Postseason Population Estimate:** ~8,600

The Rattlesnake Pronghorn Herd Unit has a post-season population management objective of 12,000 pronghorn. The herd is managed using the special management strategy, with a goal of maintaining preseason buck ratios between 60-70 bucks per 100 does. The objective and management strategy were last revised in 1988, and will be formally reviewed in 2014.

## **Herd Unit Issues**

The 2012 post-season population estimate was approximately 8,300 and trending downward. This herd unit did not have a functional population model until 2012, when a spreadsheet-based modeling system replaced the program POP-II to simulate herd dynamics. Prior management decisions for this herd were made using a combination of classification data, harvest statistics, observations of field personnel, and comments from hunters and landowners regarding pronghorn numbers. Line transect surveys were also conducted in 1998, 2000, and 2003 to provide end-of-year population estimates. A subsequent line transect surveys conducted in 2007 was deemed unusable and discarded. An additional line transect survey is scheduled for May 2013. The current model is considered to be of fair quality, as personnel believe there to be significant interchange between the Rattlesnake and Beaver Rim Herd Units. For this reason, these two herd units are being combined into one herd unit in 2013.

Hunting access within the herd unit is moderate, with some large tracts of public land as well as walk-in areas and a hunter management area. Traditional ranching and grazing are the primary land use over the whole herd unit, with scattered areas of oil and gas development. Hunt Area 70 & 71 are dominated by private lands. License issuance is consistently maintained in Area 70 to address damage issues on irrigated agricultural fields. Periodic disease outbreaks (i.e. hemorrhagic diseases, *Clostridium spp.* infections) are possible in this herd and can contribute to population declines when environmental conditions are suitable.

## **Weather**

The winter of 2011-2012 was mild with below average snow accumulations and relatively warm temperatures. The growing season of 2012 through early winter of 2013 was extremely dry with above average temperatures. During the same time period, available water, forage growth, and forage quality were below average. As a result, very poor fawn ratios of 43:100 does were observed during 2012 preseason classification surveys. Distribution of pronghorn within the herd unit shifted to those few areas where water and forage were available along drainages and near reservoirs. Several landowners discovered dead antelope in late summer near water. These mortalities were likely due to hemorrhagic disease, which was confirmed in many parts of Wyoming in 2012. Continued lack of quality forage over the winter of 2012-2013 could escalate pronghorn mortality in the spring of 2013, particularly if late snow accumulations create an additional stressor.

## **Habitat**

This herd unit has no established habitat transects that measure production and/or utilization on shrub species that are preferred browse for pronghorn. Additionally, there are no comparable



habitat transects in neighboring herd units to reference. Anecdotal observations and discussions with landowners in the region indicate that summer and winter forage availability for pronghorn was very poor in 2012. Herbaceous forage species were observed to be in extremely poor condition, which likely contributed to diminished nutrition for lactating does and their fawns.

## **Field Data**

Fawn ratios were high in this herd from 1998-2005, and the population grew markedly during this time period. However, license issuance was modest and the population grew above management control by harvest. Fawn ratios were moderate from 2006-2010, but pronghorn populations were already high by this time period. License issuance increased significantly every year from 2006-2011 in an attempt to curb high pronghorn numbers and reduce the herd toward objective. By 2011, environmental factors combined with low fawn ratios and high harvest pressure rapidly reduced this herd to near or below objective. Harsh winter conditions in 2010-11 combined with severe drought in 2012 have since dropped this herd unit below management objective. License issuance has thus become more conservative.

Buck ratios for the Rattlesnake Herd historically range from the mid 40s to mid 70s per 100 does. Buck ratios are most commonly in the upper 50s, just below the lower limit for special management. In more recent years, buck ratios have dropped to the mid-40s as a result of low fawn recruitment and high harvest pressure on a diminishing population. While it can be difficult to maintain this herd within the range of special management, hunters have developed high expectations for buck numbers and quality within this herd. Managers thus plan to manage pronghorn so as to improve and maintain the buck ratio within special management parameters.

## **Harvest Data**

License success in this herd unit is typically in the 90<sup>th</sup> percentile. Success declined the last two years to the low end of that range and days per animal increased, indicating pronghorn were more difficult for hunters to find and harvest. Despite drastic reductions in license numbers in 2012, license success and hunter days remained mediocre, and many hunters remarked that bucks were more difficult to find and of lower quality. Given suppressed fawn production and declining buck ratios, managers recommend further license reductions in 2013 with the goal of improving buck ratios and population numbers overall.

## **Population**

The 2012 post-season population estimate was approximately 8,300 and trending downward. This herd unit did not have a functional population model until 2012, when a spreadsheet-based modeling system replaced the program POP-II to simulate herd dynamics. Prior management

decisions for this herd were made using a combination of classification data, harvest statistics, observations of field personnel, and comments from hunters and landowners regarding pronghorn numbers. Line transect surveys were also conducted in 1998, 2000, and 2003 to provide end-of-year population estimates. A subsequent line transect survey conducted in 2007 was deemed unusable and discarded. Personnel believe there to be significant interchange between the Rattlesnake and Beaver Rim Herd Units. For this reason, these two herd units may be combined into one herd unit in 2013-2014.

The “Time-Specific Juvenile Survival – Constant Adult Survival” (TSJ,CA) spreadsheet model was chosen for the post-season population estimate of this herd. This model seemed most representative of the herd, as it selects for low juvenile survival in the years when managers agree that overwinter fawn survival was very poor – particularly in 2010 and 2011. The simpler models (CJ,CA and SCA,CA) select for higher juvenile survival rates across years, which does not seem feasible for this herd. All three models follow a trend that is plausible; however the CJ,CA model shows an extremely high buck harvest percentage in 2011, and the SCA,CA model shows a 2006 population peak that seems unrealistic. None of the three models track well with the three line transect estimates, but rather track in between them. While the AIC for the TSJ,CA model is the highest of the three, it is only due to year-by-year penalties on juvenile survival and is still well within one level of power in comparison to the AICs of the simpler models. The TSJ, CA model appears to be the best representation relative to the perceptions of managers on the ground and follows trends with license issuance and harvest success. Overall the model is considered fair in quality as a representation of herd dynamics.

## **Management Summary**

Traditional season dates in this herd run from September 15<sup>th</sup> through October 31<sup>st</sup>, and through November 30<sup>th</sup> for Area 70 Type 6 licenses. The same season dates will be applied for 2013, with a reduction of licenses in lieu of poor fawn ratios and declining buck ratios. The 2013 season includes a total of 1,000 Type 1 and 700 Type 6 licenses. While fawn ratios and population trend has declined in recent years, habitat conditions are also poor due to recent drought. Goals for 2013 are to improve antelope numbers gradually back towards objective while giving time for habitats to recover, improve buck ratios, and increase hunter success.

If we attain the projected harvest of 1,310 pronghorn with fawn ratios similar to the last few years, this herd will increase slightly in number. The predicted 2013 post-season population size for the Rattlesnake Pronghorn Herd is approximately 8,600 animals.

INPUT

Species:  
Biologist:  
Herd Unit & No.:  
Model date:

Pronghorn  
Heather O'Brien  
PR745 Rattlesnakes  
02/28/13

MODELS SUMMARY				Notes
		Relative AICc	Fit	
CJ,CA	Constant Juvenile & Adult Survival	145	136	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	145	134	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	177	69	

Population Estimates from Top Model													
Year	Predicted Prehunt Population (year <i>t</i> )			Predicted Posthunt Population (year <i>t</i> )			Total	Predicted adult End-of-bio-year Pop (year <i>t</i> )			LT Population Estimate Field Est	Trend Count	Objective
	Juveniles	Total Males	Females	Juveniles	Total Males	Females		Total Males	Females	Total Adults			
1993	2266	2169	4063	2132	1331	3271	6733	2038	3764	5802			12000
1994	2804	1998	3689	2774	1503	3491	7768	1874	3675	5549			12000
1995	2447	1836	3602	2430	1329	3445	7204	2224	4147	6371			12000
1996	3590	2180	4064	3577	1767	3881	9226	3153	5057	8209			12000
1997	3986	3090	4955	3956	2551	4759	11265	3887	5889	9776			12000
1998	4074	3809	5771	4039	2975	5470	12483	3338	5620	8957	7272	1152	12000
1999	3630	3271	5507	3577	2082	5118	10777	2896	5694	8590			12000
2000	3819	2838	5580	3774	1986	5312	11072	3375	6402	9777	12708	2202	12000
2001	4567	3308	6274	4545	2874	6183	13602	3410	6387	9797			12000
2002	4114	3341	6259	4101	2779	6101	12981	3220	6217	9437	7357	1396	12000
2003	4618	3156	6093	4584	2467	5831	12882	4197	7235	11432			12000
2004	6724	4113	7090	6701	3347	6693	16741	5073	8087	13161			12000
2005	6454	4972	7926	6408	4142	7567	18117	4853	7950	12803			12000
2006	5147	4756	7791	5081	3768	7257	16106	5262	8415	13677			12000
2007	4716	5157	8247	4572	3830	7503	15905	5307	8640	13947			12000
2008	4739	5201	8468	4688	3913	7481	16082	5444	8646	14090			12000
2009	4460	5335	8473	4433	3796	7180	15409	5191	8222	13413			12000
2010	4888	5087	8058	4741	3301	6647	14689	3607	6623	10230			12000
2011	2912	3535	6491	2838	1936	5174	9948	2649	5526	8175			12000
2012	2331	2596	5416	2251	1540	4613	8404	2473	5364	7837			12000
2013	2319	2424	5257	2253	1544	4762	8559						12000
2014													12000
2015													12000
2016													12000
2017													12000
2018													12000
2019													12000
2020													12000
2021													12000
2022													12000
2023													12000
2024													12000
2025													12000

# Survival and Initial Population Estimates

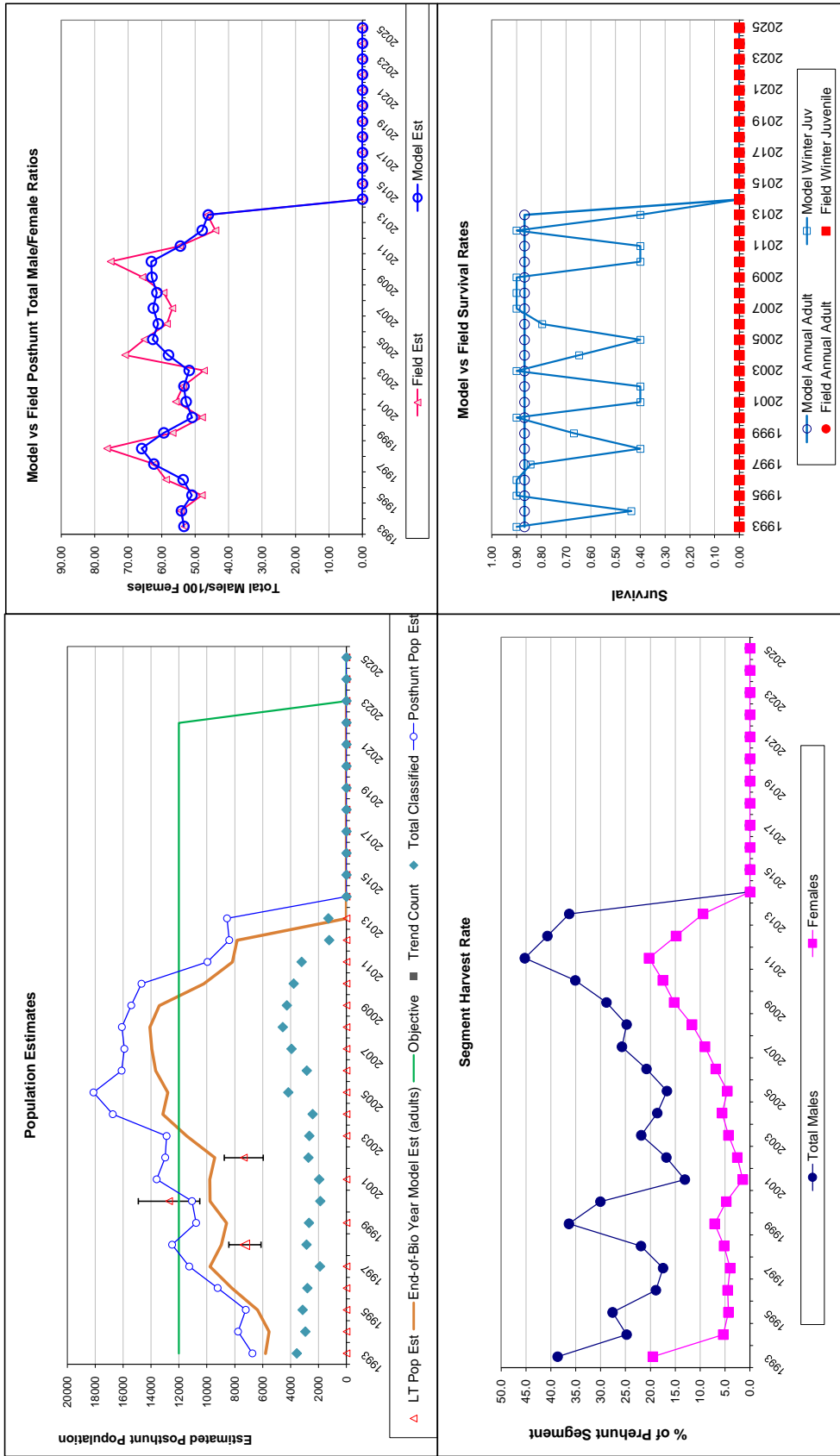
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est SE	Model Est	Field Est SE
1993	0.90		0.87	
1994	0.44		0.87	
1995	0.90		0.87	
1996	0.90		0.87	
1997	0.84		0.87	
1998	0.40		0.87	
1999	0.67		0.87	
2000	0.90		0.87	
2001	0.40		0.87	
2002	0.40		0.87	
2003	0.90		0.87	
2004	0.65		0.87	
2005	0.40		0.87	
2006	0.80		0.87	
2007	0.90		0.87	
2008	0.90		0.87	
2009	0.90		0.87	
2010	0.40		0.87	
2011	0.40		0.87	
2012	0.90		0.87	
2013	0.40		0.87	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:		Optim cells
Adult Survival =		0.868
Initial Total Male Pop/10,000 =		0.217
Initial Female Pop/10,000 =		0.406

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult survival	98%



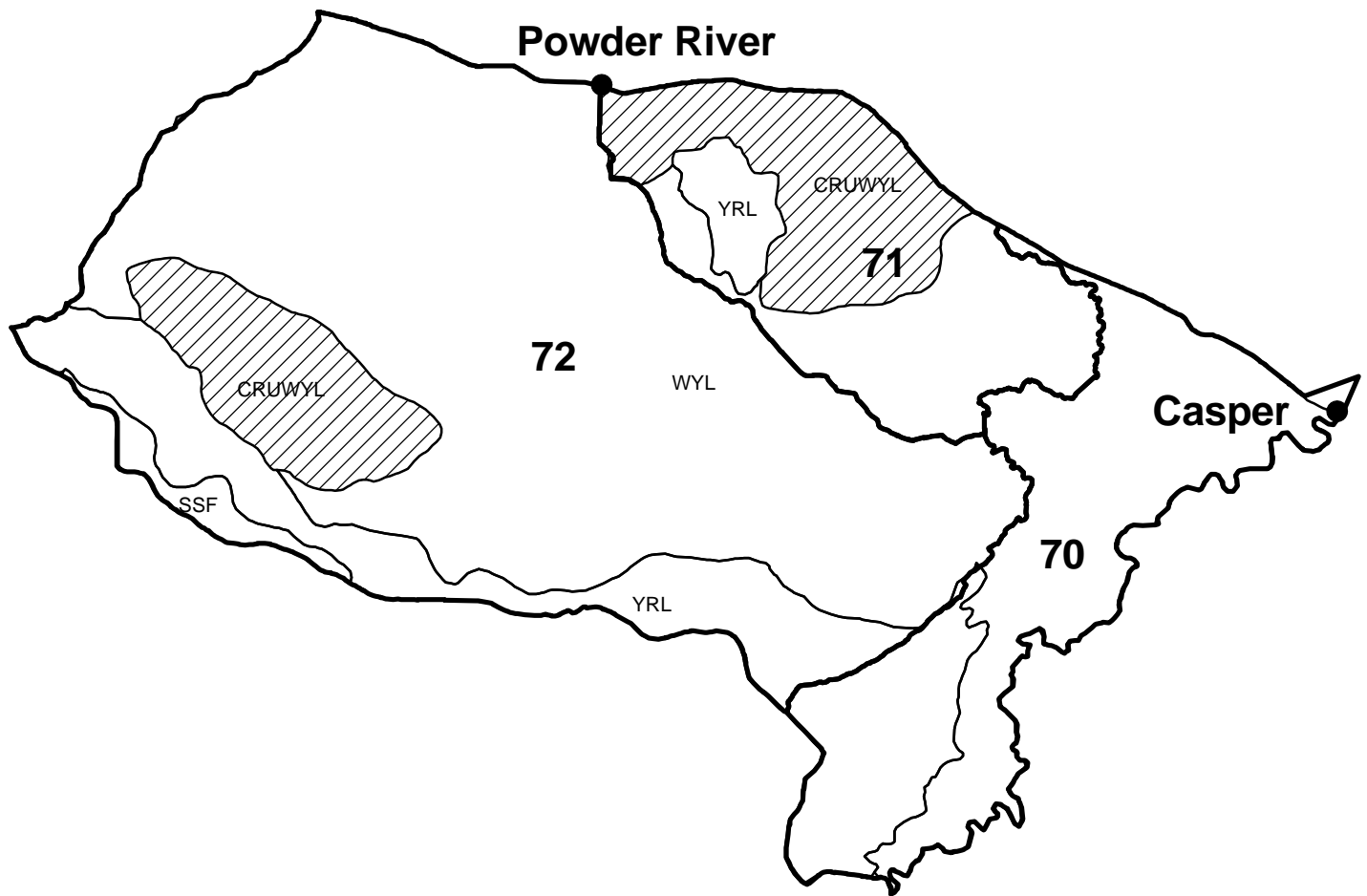
FIGURES



Comments:

END

Antelope - Rattlesnake  
Hunt Areas 70,71,72  
Casper Region  
Revised 4/88







## 2012 - JCR Evaluation Form

SPECIES: Pronghorn

PERIOD: 6/1/2012 - 5/31/2013

HERD: PR746 - NORTH NATRONA

HUNT AREAS: 73

PREPARED BY: HEATHER  
O'BRIEN

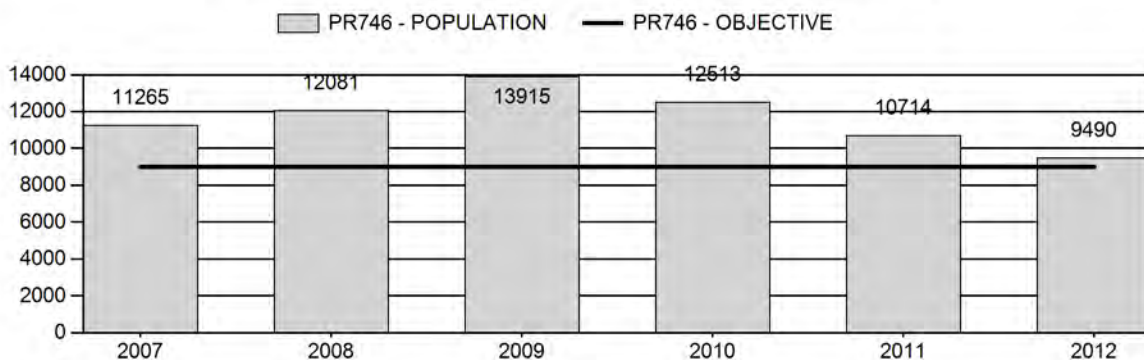
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	12,098	9,490	9,311
Harvest:	991	990	825
Hunters:	1,123	1,119	900
Hunter Success:	88%	88%	92%
Active Licenses:	1,176	1,185	950
Active License Percent:	84%	84%	87%
Recreation Days:	3,235	3,901	2,700
Days Per Animal:	3.3	3.9	3.3
Males per 100 Females	60	44	
Juveniles per 100 Females	54	46	

Population Objective: 9,000  
 Management Strategy: Recreational  
 Percent population is above (+) or below (-) objective: 5%  
 Number of years population has been + or - objective in recent trend: 15  
 Model Date: 2/28/2013

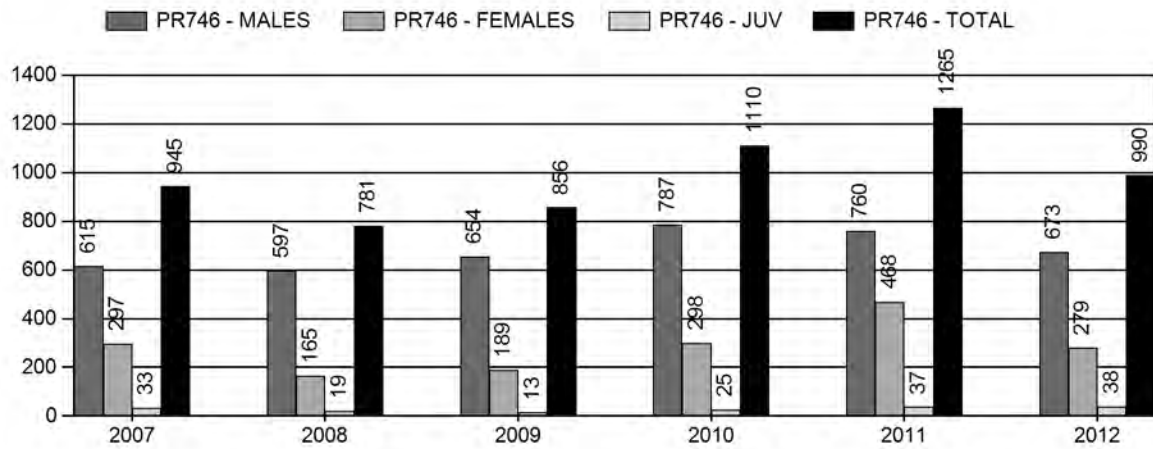
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	7.9%	5.3%
Males ≥ 1 year old:	25.4%	30.3%
Juveniles (< 1 year old):	.7%	.01%
Total:	10.27%	8.96%
Proposed change in post-season population:	-10.5%	-7.9%

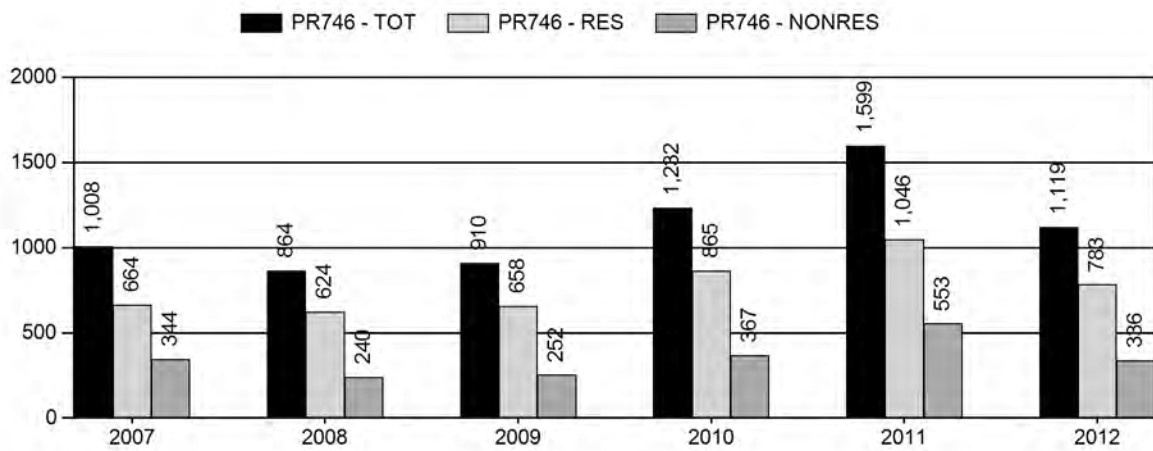
## Population Size - Postseason



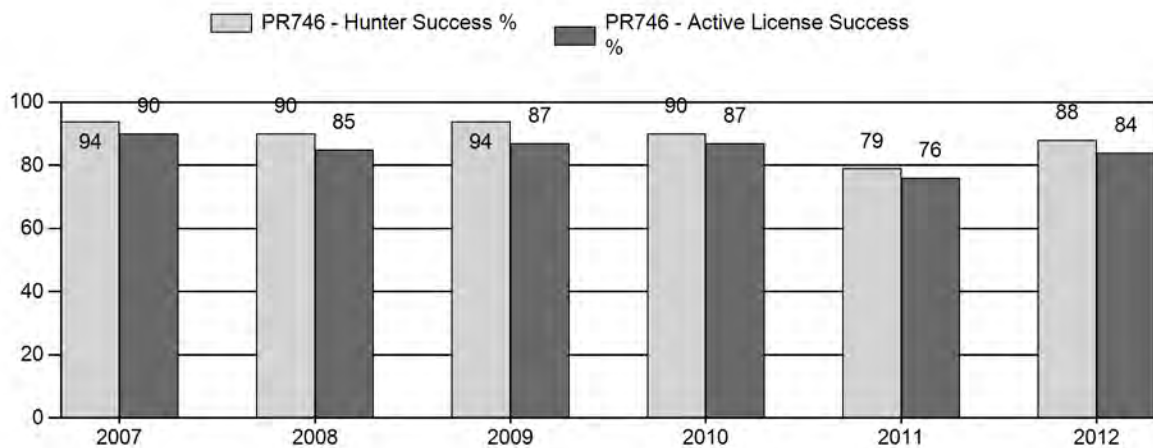
## Harvest



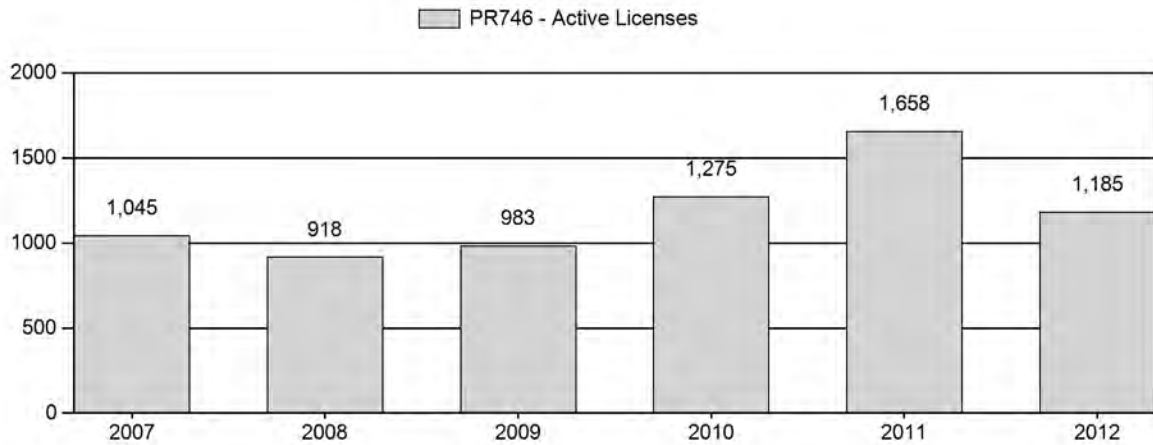
## Number of Hunters



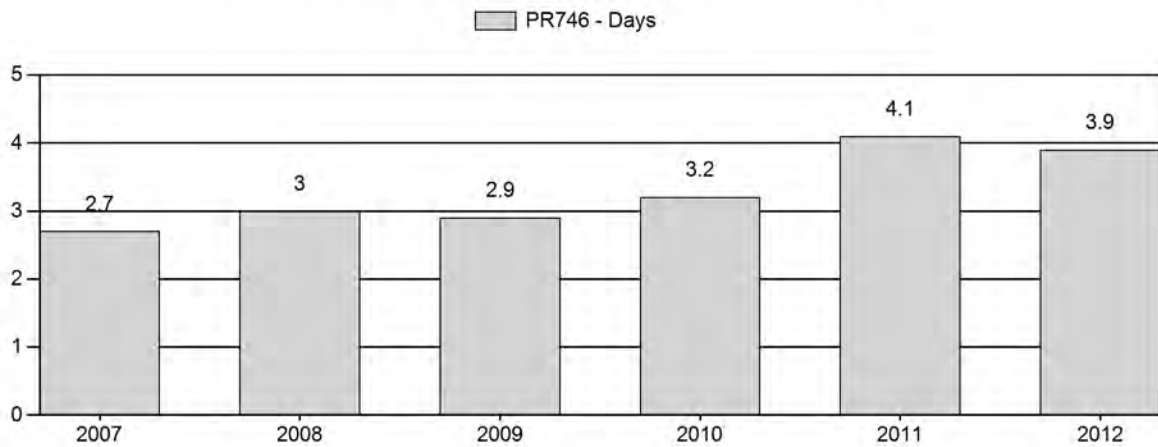
## Harvest Success



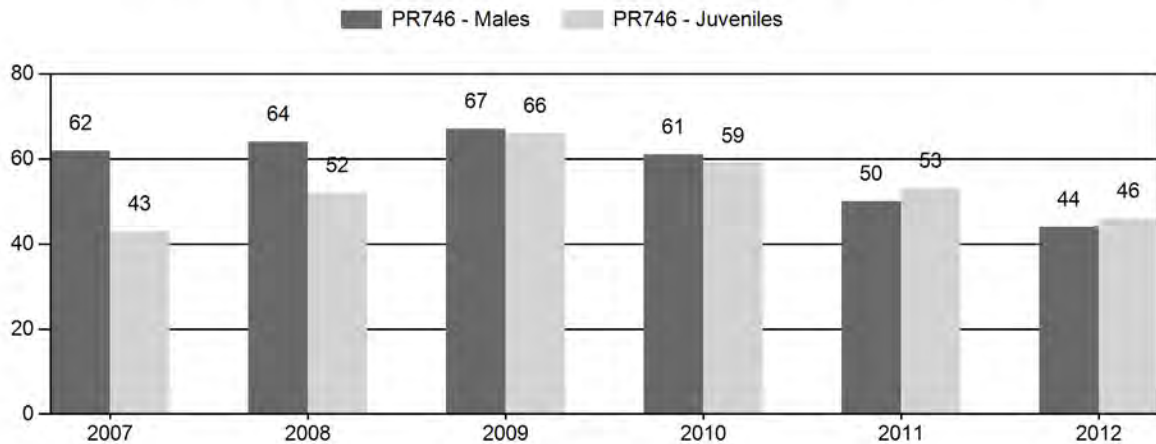
## Active Licenses



## Days Per Animal Harvested



## Preseason Animals per 100 Females



**2007 - 2012 Preseason Classification Summary**

for Pronghorn Herd PR746 - NORTH NATRONA

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	12,305	368	547	915	30%	1,485	49%	637	21%	3,037	1,804	25	37	62	± 4	43	± 3	27
2008	12,940	245	380	625	30%	972	46%	508	24%	2,105	2,056	25	39	64	± 5	52	± 4	32
2009	14,856	273	541	814	29%	1,218	43%	809	28%	2,841	2,361	22	44	67	± 4	66	± 4	40
2010	13,734	172	392	564	28%	932	46%	552	27%	2,048	1,988	18	42	61	± 5	59	± 5	37
2011	12,124	119	540	659	25%	1,322	49%	697	26%	2,678	2,129	9	41	50	± 3	53	± 4	35
2012	10,579	127	190	317	23%	713	53%	327	24%	1,357	1,843	18	27	44	± 5	46	± 5	32

**2013 HUNTING SEASONS**  
**NORTH NATRONA PRONGHORN HERD (PR746)**

Hunt Area	Type	Date of Seasons		Quota	Limitations
		Opens	Closes		
73	1	Sept. 15	Oct. 31	800	Limited quota; any antelope
	6	Sept. 15	Oct. 31	100	Limited quota; doe or fawn antelope
	7	Sept. 15	Oct. 31	100	Limited quota; doe or fawn antelope valid on private land east of the Bucknum Rd (Natrona County Road 125) within the Casper Creek drainage
Archery		Aug. 15	Sept. 14		Refer to license type and limitations in Section 3

Hunt Area	Type	Quota change from 2012
73	1	-100
	6	-100
	7	-100

**Management Evaluation**

**Current Postseason Population Management Objective:** ~ 9,000

**Management Strategy:** Recreational

**2012 Postseason Population Estimate:** ~ 9,500

**2013 Proposed Postseason Population Estimate:** ~ 9,300

The North Natrona Herd unit has a post-season population management objective of 9,000 pronghorn. The herd is managed using the recreational management strategy, with a goal of maintaining preseason buck ratios between 30-59 bucks per 100 does. The objective and management strategy were last revised in 1987, and will be formally reviewed in 2014.

**Herd Unit Issues**

Hunting access within the herd unit is very good, with large tracts of public lands as well as walk-in areas available for hunting. The southeastern corner of the herd unit is the only area dominated by private lands. In this area, specific doe/fawn licenses have been added to address damage issues on irrigated agricultural fields. The main land use within the herd unit is traditional ranching and grazing of livestock. Industrial scale developments, including oil and gas development, are limited and isolated within this herd unit. Periodic disease outbreaks (i.e. hemorrhagic diseases, *Clostridium spp.* infections) can impact this herd and contribute to population declines when environmental conditions are suitable.

## **Weather**

The winter of 2011-2012 was mild with below average snow accumulations and relatively warm temperatures. The growing season of 2012 through early winter of 2013 were extremely dry with above average temperatures. During the same time period, available water, forage growth, and forage quality were below average. As a result, very poor fawn ratios of 46:100 were observed during 2012 preseason classification surveys. The continued lack of quality forage in the winter of 2012-2013 could result in increased pronghorn mortality in spring of 2013, particularly if late snow accumulations create an additional stressor.

## **Habitat**

This herd unit has no established habitat transects that measure production and/or utilization on shrub species that are preferred browse for pronghorn. Additionally, there are no comparable habitat transects in neighboring herd units to reference. Anecdotal observations and shrub monitoring for other big game species showed summer and winter forage availability for pronghorn to be very poor in 2012, with the possible exception of areas at higher elevations within this herd unit. Herbaceous forage species also were observed to be in poor condition, which likely contributed to diminished nutrition for lactating does and their fawns.

## **Field Data**

Fawn ratios were high in this herd from 2002-2005, and the population grew markedly during this time period. Fawn ratios were moderate to poor from 2006-2012, but the population continued to grow through 2009 as license issuance did not keep pace with herd growth. In 2010-2011, license issuance increased sharply to address high antelope numbers and reduce the herd toward objective. By 2012, higher license issuance was no longer necessary to control growth of the herd, and licenses were reduced. Hunter harvest, mortality from harsh winter conditions in 2010-2011, extremely poor fawn production/survival, and severe drought in 2012 has subsequently reduced this herd.

Buck ratios for the North Natrona Herd historically average in the mid-50s per 100 does, though they exceeded recreational limits from 2007-2010, when ratios were in the 60s. Since then, buck ratios have dropped markedly each year along with the population as a whole, reaching a 15-year low of 44 bucks per hundred does in 2012. While this is still well within the targeted range for recreational management, hunters have developed higher expectations for buck numbers and quality within this herd. Managers thus plan to strive toward the upper range of recreational management with the goal of maintaining buck ratios in the 50s.

## **Harvest Data**

License success in this herd unit is typically in the 80-90<sup>th</sup> percentile, with the exception of 2011 when license issuance remained high while the population declined. Hunter days reached a 15-year high in 2011 as well; further validating the aforementioned trend. In 2012, license issuance was cut in accordance with estimated population size, diminishing buck ratios, decreased harvest success, and increased harvest days. As a result, license success and hunter days improved in 2012, and the population estimate seemed relatively stable around the objective of 9,000 animals.

## **Population**

The 2012 post-season population estimate was approximately 9,500 and trending downward from an estimated high of 14,000 pronghorn in 2009. The last line transect in this herd unit in 2003 resulted in an estimated end-of-year population of 8,500 pronghorn, with a standard error of about 1,000. An additional line transect survey will be conducted in May 2013 to further refine the population model.

The “Time-Specific Juvenile Survival - Constant Adult Survival” (TSJ,CA) spreadsheet model was chosen to use for the post-season population estimate of this herd. This model seemed the most representative of the herd, as it selects for higher juvenile survival during the years when field personnel observed more favorable environmental and habitat conditions, particularly from 2003-2008. The simpler models (CJ,CA and SCJ,CA) select for a very low juvenile survival rate across years, which does not seem feasible for this herd. All three models follow a trend that seems representative for this herd unit, and all three models align with two of the three line transect population estimates. However, the CJ,CA and SCJ,CA models estimate population peaks in 2009 that do not seem realistic compared to the perceptions of field personnel and landowners at that time. While the AIC for the TSJ,CA model is the highest of the three, it is only due to year-by-year penalties and is still well within one level of power in comparison to the AICs of the simpler models. Overall the model is considered to be fair in representing dynamics of the herd. The TSJ, CA model aligns with two of three line transect estimates, appears to be the best representation relative to the perceptions of managers on the ground, and follows trends with license issuance and harvest success.

## **Management Summary**

Traditional season dates in this herd run from September 15<sup>th</sup> through October 31<sup>st</sup>. Season dates will remain the same for 2013, with a reduction of licenses to compensate for poor fawn ratios and declining buck ratios. The 2013 season includes 800 Type 1 licenses, 100 Type 6 licenses, and 100 Type 7 licenses. Type 7 licenses are adjusted accordingly with available access from year to year, and access is predicted to be similar to 2012 in 2013. While fawn ratios and

population growth rates have been poor in recent years, habitat conditions are now poor due to recent drought. Goals for 2013 are to maintain pronghorn numbers near objective, improve the buck ratio, and increase hunter success.

If we attain the projected harvest of 825 with fawn ratios similar to the last few years, this herd will maintain itself near objective. The predicted 2013 post-season population size of the North Natrona Pronghorn Herd is approximately 9,300 animals.



<b>INPUT</b>	
<b>Species:</b>	Pronghorn
<b>Biologist:</b>	Heather O'Brien
<b>Herd Unit &amp; No.:</b>	North Natrona
<b>Model date:</b>	02/28/13

MODELS SUMMARY			
	Fit	Relative AICc	Notes
CJ,CA	Constant Juvenile & Adult Survival	110	
SC,J,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	110	
TS,J,CA	Time-Specific Juvenile & Constant Adult Survival	147	

Check best model to create report

- ☐ CJ,CA Model  
☐ SC,J,SCA Mod  
☐ TS,J,CA Model

Population Estimates from Top Model													
Year	Predicted Prehunt Population (year <i>t</i> )			Predicted Posthunt Population (year <i>t</i> )			Total	Predicted adult End-of-bio-year Pop (year <i>t</i> )			LT Population Estimate	Trend Count	Objective
	Juveniles	Total Males	Females	Juveniles	Total Males	Females		Total Males	Females	Total Adults			
1993	2477	2151	3920	2410	1438	3389	7238	2291	4053	6344			9000
1994	3192	2245	3972	3171	1816	3864	8851	2388	4253	6641			9000
1995	3003	2340	4168	2991	1930	4079	9000	2272	4227	6499			9000
1996	4103	2227	4143	4092	1824	3985	9902	2404	4360	6764			9000
1997	2382	2356	4273	2358	1930	4138	8425	2468	4471	6939			9000
1998	4106	2418	4382	4079	1961	4242	10282	2511	4584	7095	5485	995	9000
1999	3044	2461	4492	3033	2041	4366	9440	2543	4652	7195			9000
2000	3427	2492	4559	3413	2038	4410	9862	2523	4675	7197	8211	1412	9000
2001	3015	2472	4581	2978	2151	4477	9606	2470	4569	7040			9000
2002	3202	2421	4478	3193	1981	4301	9475	2356	4456	6811			9000
2003	3289	2309	4367	3276	1848	4180	9304	2852	4964	7817	8514	1020	9000
2004	4082	2795	4865	4031	2230	4663	10923	3015	5229	8244			9000
2005	4352	2955	5124	4320	2312	4892	11523	3536	5887	9423			9000
2006	3035	3465	5769	3016	2792	5395	11204	3783	6140	9922			9000
2007	2581	3707	6017	2545	3030	5690	11265	3777	6191	9968			9000
2008	3171	3702	6067	3150	3045	5886	12081	4071	6663	10734			9000
2009	4337	3990	6530	4323	3271	6322	13915	3697	6480	10176			9000
2010	3761	3623	6350	3734	2757	6022	12513	3096	6074	9170			9000
2011	3138	3034	5952	3097	2183	5434	10714	2587	5627	8214			9000
2012	2529	2535	5515	2487	1795	5208	9490	2489	5598	8088			9000
2013	2462	2439	5486	2417	1700	5194	9311						9000
2014													
2015													
2016													
2017													
2018													
2019													
2020													
2021													
2022													
2023													
2024													
2025													

# Survival and Initial Population Estimates

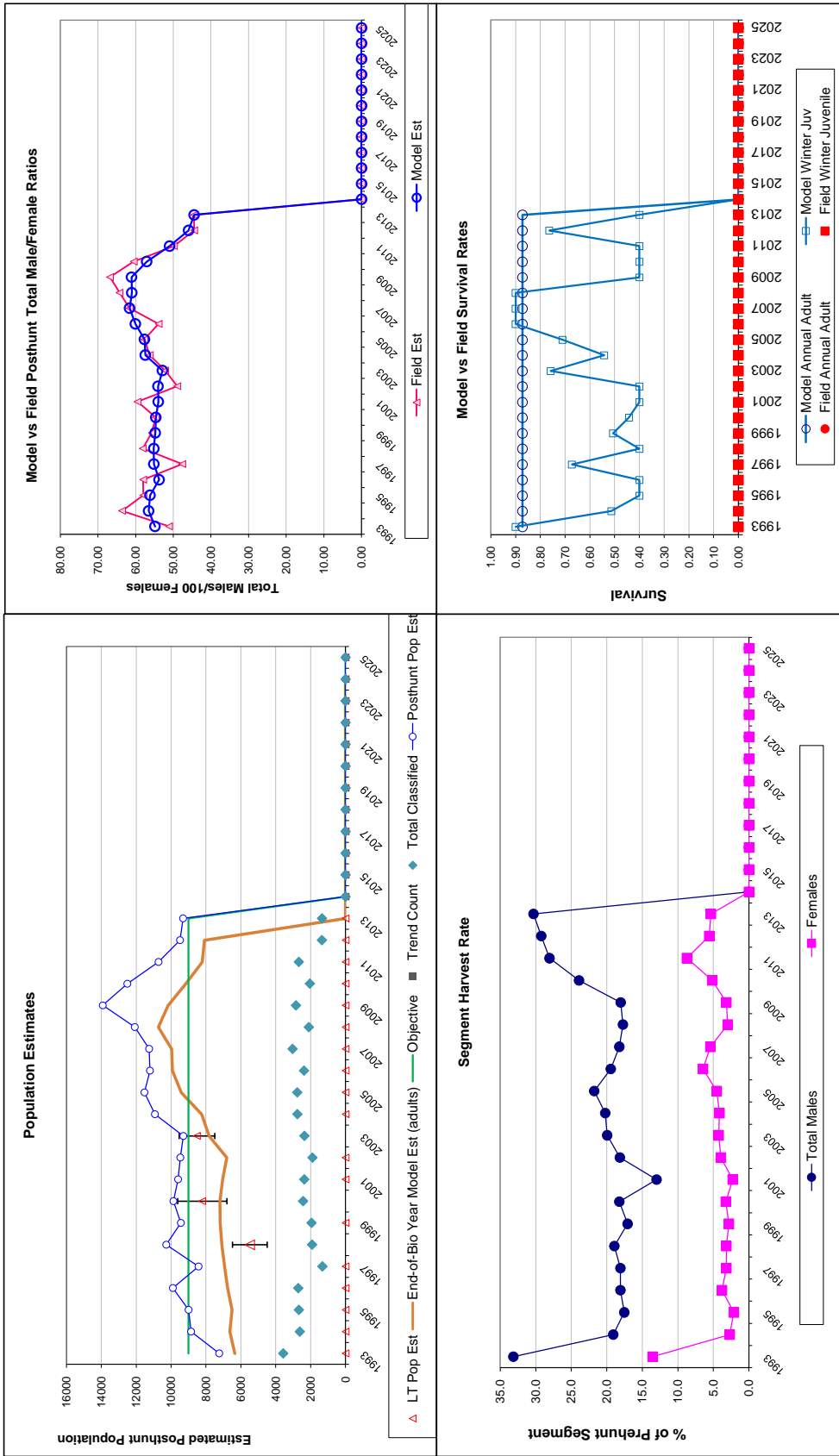
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est SE	Model Est	Field Est SE
1993	0.90		0.87	
1994	0.51		0.87	
1995	0.40		0.87	
1996	0.40		0.87	
1997	0.67		0.87	
1998	0.40		0.87	
1999	0.51		0.87	
2000	0.44		0.87	
2001	0.40		0.87	
2002	0.40		0.87	
2003	0.76		0.87	
2004	0.54		0.87	
2005	0.71		0.87	
2006	0.90		0.87	
2007	0.90		0.87	
2008	0.90		0.87	
2009	0.40		0.87	
2010	0.40		0.87	
2011	0.40		0.87	
2012	0.76		0.87	
2013	0.40		0.87	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:		Optim cells
Adult Survival =		0.873
Initial Total Male Pop/10,000 =		0.215
Initial Female Pop/10,000 =		0.392

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult survival	98%

Year	Classification Counts					Harvest				
	Juvenile/Female Ratio		Total Male/Female Ratio			Males		Females		Total Harvest
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Males	Females	Juveniles	
1993		63.21	2.49	54.88	51.14	2.15	648	482	61	1191
1994		80.37	3.67	56.54	63.63	3.11	390	98	19	507
1995		72.06	3.26	56.15	57.95	2.81	373	81	11	465
1996		99.05	4.32	53.75	58.01	2.95	366	143	10	519
1997		55.74	3.65	55.13	47.63	3.28	387	123	22	532
1998		93.70	4.88	55.19	58.14	3.47	416	127	24	567
1999		67.78	3.61	54.78	55.73	3.15	382	115	10	507
2000		75.17	3.53	54.67	54.67	2.83	413	135	12	560
2001		65.81	3.22	53.96	59.52	3.01	292	95	33	420
2002		71.51	3.78	54.06	48.95	2.91	400	161	8	569
2003		75.31	3.57	52.87	52.17	2.77	419	170	11	600
2004		83.91	3.66	57.46	56.26	2.76	514	184	47	745
2005		84.93	3.71	57.67	57.67	2.82	585	211	29	825
2006		52.60	2.64	60.06	53.91	2.68	612	340	17	969
2007		42.90	2.03	61.61	61.62	2.59	615	297	33	945
2008		52.26	2.86	61.01	64.30	3.30	597	165	19	781
2009		66.42	3.01	61.11	66.83	3.03	654	189	13	856
2010		59.23	3.18	57.05	60.52	3.23	787	298	25	1110
2011		52.72	2.47	50.97	49.85	2.38	774	471	37	1282
2012		45.86	3.06	45.97	44.46	3.00	673	279	38	990
2013		44.88	3.02	44.46	44.46	3.00	650	160	15	825
2014										
2015										
2016										
2017										
2018										
2019										
2020										
2021										
2022										
2023										
2024										
2025										

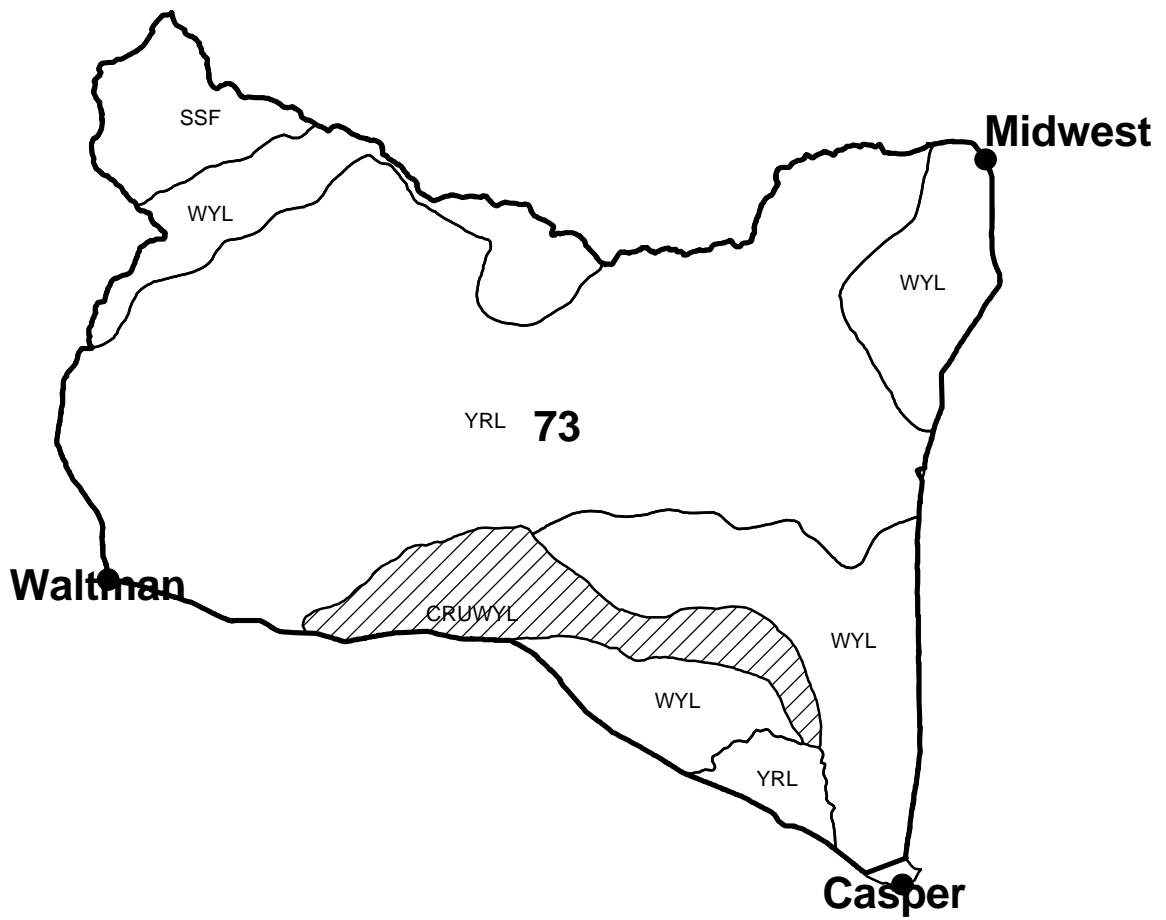
FIGURES



Comments:

END

Antelope - North Natrona  
Hunt Area 73  
Casper Region  
Revised 4/88





## 2012 - JCR Evaluation Form

SPECIES: Pronghorn

PERIOD: 6/1/2012 - 5/31/2013

HERD: PR748 - NORTH CONVERSE

HUNT AREAS: 25-26

PREPARED BY: ERIKA  
PECKHAM

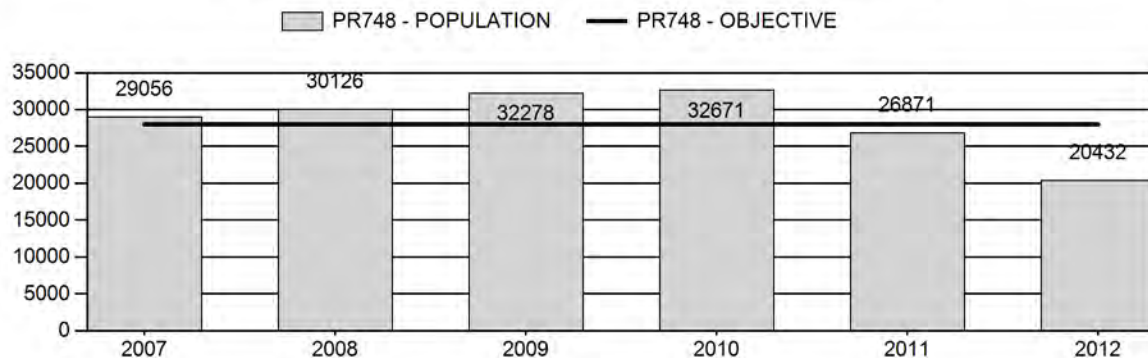
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	30,200	20,432	17,463
Harvest:	2,784	3,169	2,395
Hunters:	2,856	3,822	3,000
Hunter Success:	97%	83%	80%
Active Licenses:	3,034	3,964	2,850
Active License Percent:	92%	80%	84%
Recreation Days:	9,599	11,944	9,000
Days Per Animal:	3.4	3.8	3.8
Males per 100 Females	70	59	
Juveniles per 100 Females	73	66	

Population Objective:	28,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-27.0%
Number of years population has been + or - objective in recent trend:	3
Model Date:	02/22/2013

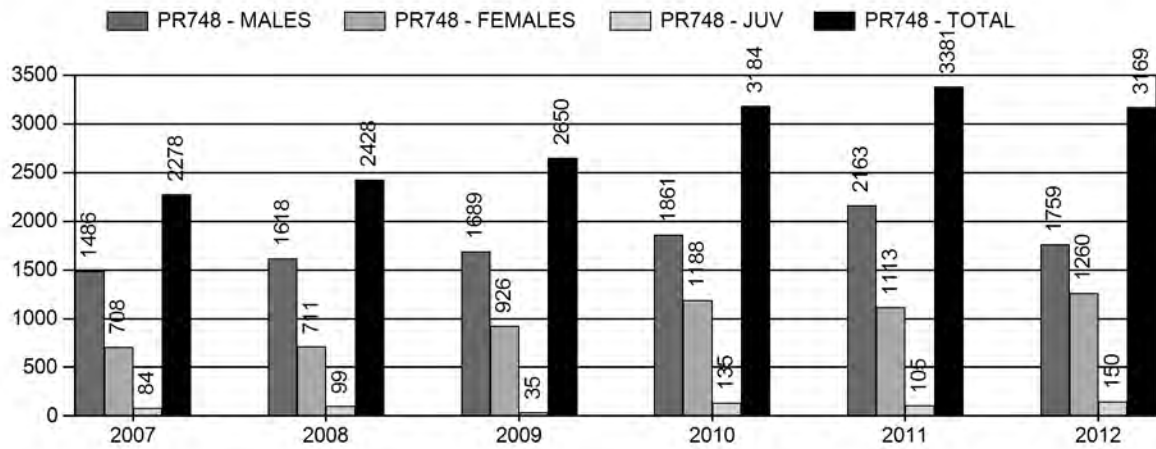
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq$ 1 year old:	10%	10%
Males $\geq$ 1 year old:	28%	33%
Juveniles (< 1 year old):	1%	0%
Total:	12%	12%
Proposed change in post-season population:	-8%	-15%

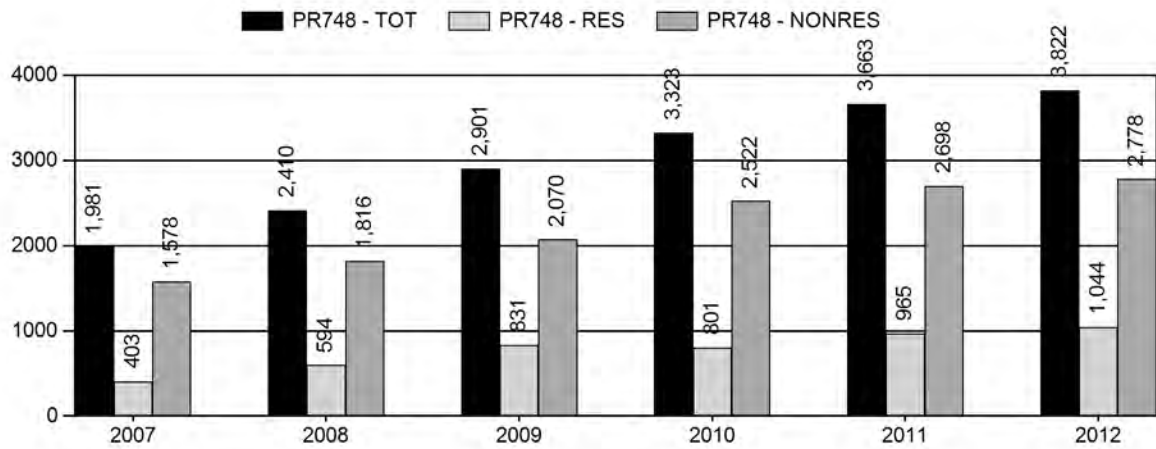
## Population Size - Postseason



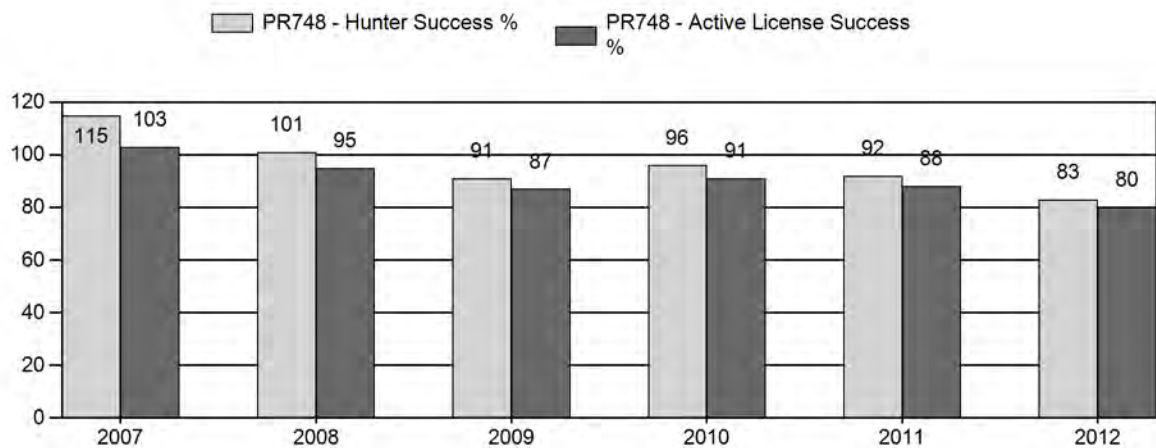
## Harvest



## Number of Hunters

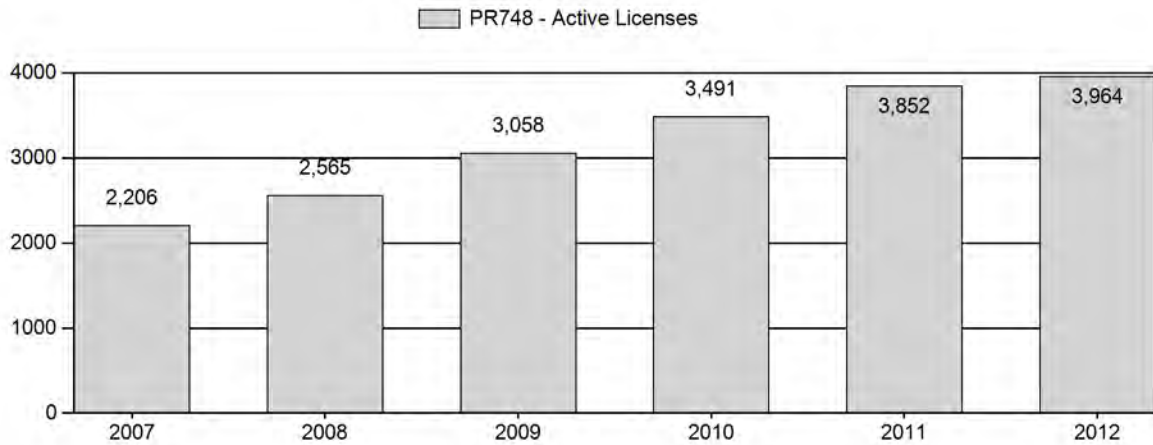


## Harvest Success

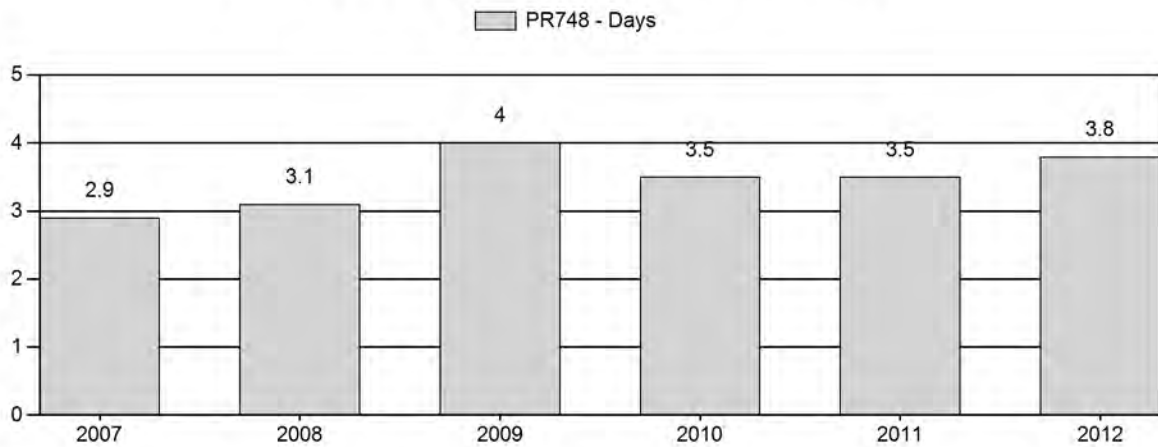




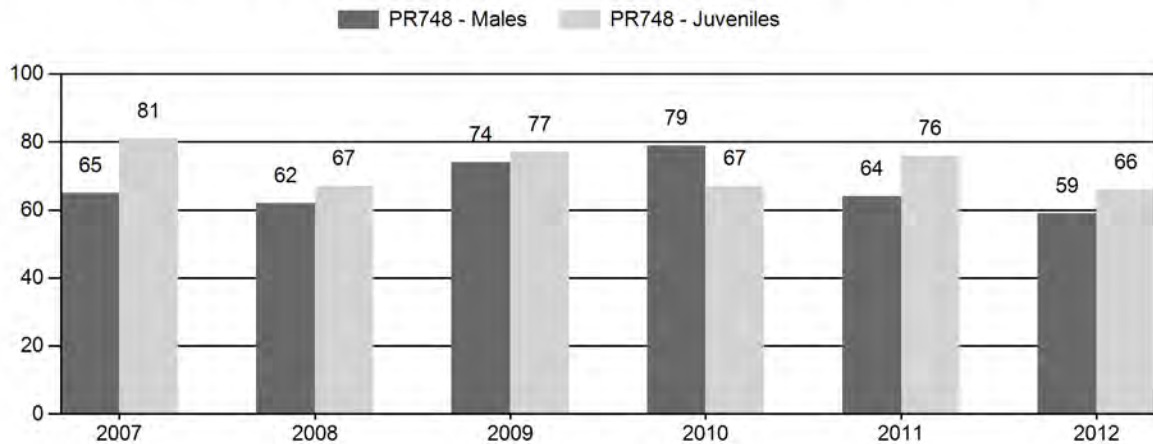
## Active Licenses



## Days Per Animal Harvested



## Preseason Animals per 100 Females



## 2007 - 2012 Preseason Classification Summary

for Pronghorn Herd PR748 - NORTH CONVERSE

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	31,562	343	442	785	27%	1,200	41%	974	33%	2,959	3,523	29	37	65	± 5	81	± 5	49
2008	32,797	289	488	777	27%	1,248	44%	832	29%	2,857	3,496	23	39	62	± 4	67	± 5	41
2009	35,193	312	740	1,052	29%	1,430	40%	1,101	31%	3,583	3,287	22	52	74	± 5	77	± 5	44
2010	36,174	373	807	1,180	32%	1,490	41%	999	27%	3,669	3,160	25	54	79	± 5	67	± 4	37
2011	30,590	93	480	573	27%	895	42%	683	32%	2,151	3,105	10	54	64	± 5	76	± 6	47
2012	23,918	82	253	335	26%	567	44%	376	29%	1,278	3,040	14	45	59	± 7	66	± 7	42

**2013 HUNTING SEASONS  
NORTH CONVERSE PRONGHORN HERD (PR748)**

<b>Hunt Area</b>	<b>Type</b>	<b>Dates of Seasons</b>		<b>Quota</b>	<b>Limitations</b>
		<b>Opens</b>	<b>Closes</b>		
25	1	Oct. 1	Oct. 14	900	Limited quota licenses; any antelope
	6	Oct. 1	Oct. 14	500	Limited quota licenses; doe or fawn
26	1	Sep. 24	Oct. 14	1,200	Limited quota licenses; any antelope
	6	Sep. 24	Oct. 14	800	Limited quota licenses; doe or fawn
Archery		Aug. 15	Sep. 30		Refer to license type and limitations in Section 3

<b>Hunt Area</b>	<b>Type</b>	<b>Quota change from 2012</b>
25	1	-100
	6	-300
26	1	-300
	6	-400
<b>Herd Unit Total</b>	<b>1</b>	<b>-400</b>
	<b>6</b>	<b>-700</b>

**Management Evaluation**

**Current Postseason Population Management Objective: 28,000**

**Management Strategy: Recreational**

**2012 Postseason Population Estimate: ~20,400**

**2013 Proposed Postseason Population Estimate: ~17,500**

**Herd Unit Issues**

The management objective for the North Converse Pronghorn Herd Unit is a post-season population objective of 28,000 pronghorn. This herd is managed under the recreational management strategy, with a goal of maintaining preseason buck ratios between 30-59 bucks per 100 does. The objective and management strategy were last revised in 1989.

Public hunting access within the herd unit is poor, with only small tracts of accessible public land interspersed with predominantly private lands. Two Walk-In Areas provide some additional hunting opportunity, although they are relatively small in size. Primary land uses in this herd unit include extensive oil and gas production, large-scale industrial wind generation, In-Situ uranium production, and traditional cattle and sheep grazing. In recent years, expansion of oil shale development has dramatically escalated anthropogenic disturbance throughout this herd unit.

## **Weather**

Weather conditions throughout 2012 and into 2013 were extremely dry and warmer than normal. The winters of 2011-2012 and 2012-13 were mild and with little snow accumulation. As a result, over winter survival was likely high in bio-year 2011 and is presumed to again be good in bio-year 2012. Although the model suggests low juvenile survival rates, field observations indicate otherwise.

## **Habitat**

Although there are no habitat transects in this herd unit, current habitat conditions are generally poor due to the extreme drought realized in 2012. Anecdotal observations by personnel confirm this, as there was little to no herbaceous and sagebrush forage production. In addition to poor leader growth production in 2012, sagebrush communities are likely experiencing heavy browsing pressure given remaining pronghorn densities in conjunction with large-scale domestic sheep production.

## **Field Data**

Although the spring and summer of 2012 were extraordinarily dry, it appears fawn productivity and over-summer survival did not suffer. In 2012, the fawn to doe ratio was 66, which is below the preceding 5-year average of 73 fawns per 100 does, but much higher than that of adjacent herds. Buck ratios remained fairly high in 2012 at 59, although they decreased when compared to the preceding 5-year average of 70. Prior to 2012, buck ratios have exceeded management strategy maximums due to difficult access and the preponderance of outfitting in this herd unit. In recent years, it has been increasingly difficult to meet classification sample sizes in this herd unit. In 2012, the adequate sample size was 3,100 animals, yet only 1,280 pronghorn were classified. This further corroborates the notion that this population has declined, as classification sample sizes have declined dramatically in recent years despite similar levels of effort.

## **Harvest**

This herd has the potential for rapid growth as has been seen in years past. High fawn productivity coupled with limited access have allowed this herd to exceed the management objective as recently as 2010. However, this population has recently dropped below objective and is predicted to continue to decline. As such, the reduction in licenses was warranted for 2013 to manage this herd back toward objective. In 2012 there were 4,500 licenses available (2,500 Type 1 and 2,000 Type 6). All but 92 Type 6 licenses in hunt area 25 were sold by the

close of the season. Again, the largest issue with achieving adequate harvest in this herd is access, as most of the pronghorn are found on private lands.

License success in this herd unit has averaged 92% over the preceding 5 years. In 2012, license success declined to 80%, indicating hunters had a much more difficult time locating and harvesting pronghorn in this herd unit. Days per animal also increased from the previous 5-year average.

## **Population**

The 2012 post-season population estimate is around 20,400, which according to the current model is the lowest number this herd has experienced since before 1993. This population began to decline following elevated mortality during the relatively severe 2010-2011 winter. The last line transect survey was conducted in this herd unit in May of 2004, which resulted in an estimated end-of-year population of 31,000 pronghorn.

The “Time Specific Juvenile – Constant Adult Mortality Rate” (TSJ-CA) spreadsheet model was chosen for the post-season population estimate of this herd. Although this model did not have the lowest relative AIC (154), they were all fairly close with the TSJ-CA model most accurately representing what was occurring on the ground, based on field personnel and landowner perceptions. Population trends seemed to simulate what field personnel and nearly all landowners were observing in this herd unit. This model is considered to be of fair quality.

## **Management Strategy**

The traditional season in this hunt area has been from October 1<sup>st</sup> to October 14<sup>th</sup> in hunt area 25 and from September 24<sup>th</sup> to October 14<sup>th</sup> in hunt area 26. These season dates have typically been adequate to meet landowner desires while allowing a reasonable harvest. For 2013, the number of both Type 1 and Type 6 licenses were decreased by 400 and 700, respectively. These reductions were warranted to decrease harvest pressure on both males and females given this population is now ~27% below objective and predicted to continue to decline.

If we attain the projected harvest of ~2,400 individuals and near normal fawn recruitment, this pronghorn population is projected to decrease slightly. Based on the model, we predict a 2013 postseason population of about 17,500 pronghorn.

INPUT

Species: Pronghorn

Biologist: Erika Peckham

Herd Unit & No.: North Converse (PR748)

Model date: 02/22/13

Clear form

MODELS SUMMARY				Notes
		Fit	Relative AICc	Check best model to create report
CJ,CA	Constant Juvenile & Adult Survival	130	139	<input type="checkbox"/> CJ,CA Model
SC,J,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	130	139	<input type="checkbox"/> SC,J,SCA Model
TS,J,CA	Time-Specific Juvenile & Constant Adult Survival	46	154	<input checked="" type="checkbox"/> TS,J,CA Model

Population Estimates from Top Model												
Year	Predicted Prehunt Population (year t)			Predicted Posthunt Population (year t)			Predicted adult End-of-bio-year Pop (year t)			Objective		
	Juveniles	Total Males	Females	Total	Juveniles	Total Males	Females	Total	LT Population Estimate Field Est		Trend Count Field SE	
1993	7757	9881	15186	32825	7667	8171	13984	28822	9368	14139	23507	28000
1994	12736	9181	13856	35772	12542	7075	12671	32289	7711	12397	20108	28000
1995	9953	7556	12149	29659	5759	5759	11235	26765	8434	13017	21451	28000
1996	13274	8266	12757	34296	13212	6103	12316	31631	10039	15396	25435	28000
1997	11036	9838	15088	35962	10984	8039	14621	33644	11091	16659	27749	28000
1998	15742	10869	16325	42937	15712	8985	16012	40708	9986	15962	25949	28000
1999	13000	9786	15643	38429	12956	7970	15361	36286	8621	14881	23502	28000
2000	12674	8449	14583	35706	12636	6700	14143	33479	7554	13807	21361	28000
2001	9827	7403	13531	30760	9785	5991	13225	29000	7198	13238	20437	28000
2002	11128	7054	12974	31155	11108	5696	12585	29389	7028	12763	19791	28000
2003	9994	6888	12508	29389	9921	5597	12140	27659	6207	11653	17859	28000
2004	9938	6082	11420	27440	9871	4758	11052	25681	8053	13308	21361	28000
2005	9827	7892	13042	30760	9733	6467	12431	28632	6830	11788	18618	28000
2006	9742	6693	11552	27988	9700	5337	10975	26012	8433	13122	21555	28000
2007	10438	8264	12860	31562	10346	6630	12081	29056	9702	14259	23961	28000
2008	9316	9508	13974	32797	9207	7728	13191	30126	10027	14624	24651	28000
2009	11035	9826	14332	35193	10996	7968	13313	32278	11028	15495	26523	28000
2010	10181	10807	15185	36174	10033	8760	13879	32671	8575	12840	21416	28000
2011	9603	8404	12583	30590	9487	6025	11359	26871	6725	10631	17356	28000
2012	6909	6590	10419	23918	6741	4659	9033	20432	5037	8841	13877	28000
2013	6498	4936	8664	20098	6388	3313	7762	17463				28000
2014												28000
2015												28000
2016												28000
2017												28000
2018												28000
2019												28000
2020												28000
2021												28000
2022												28000
2023												28000
2024												28000
2025												28000

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.82		0.79	
1994	0.40		0.79	
1995	0.85		0.79	
1996	0.83		0.79	
1997	0.90		0.79	
1998	0.40		0.79	
1999	0.40		0.79	
2000	0.40		0.79	
2001	0.54		0.79	
2002	0.49		0.79	
2003	0.40		0.79	
2004	0.90		0.79	
2005	0.40		0.79	
2006	0.90		0.79	
2007	0.90		0.79	
2008	0.90		0.79	
2009	0.90		0.79	
2010	0.40		0.79	
2011	0.40		0.79	
2012	0.40		0.79	
2013	0.40		0.79	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

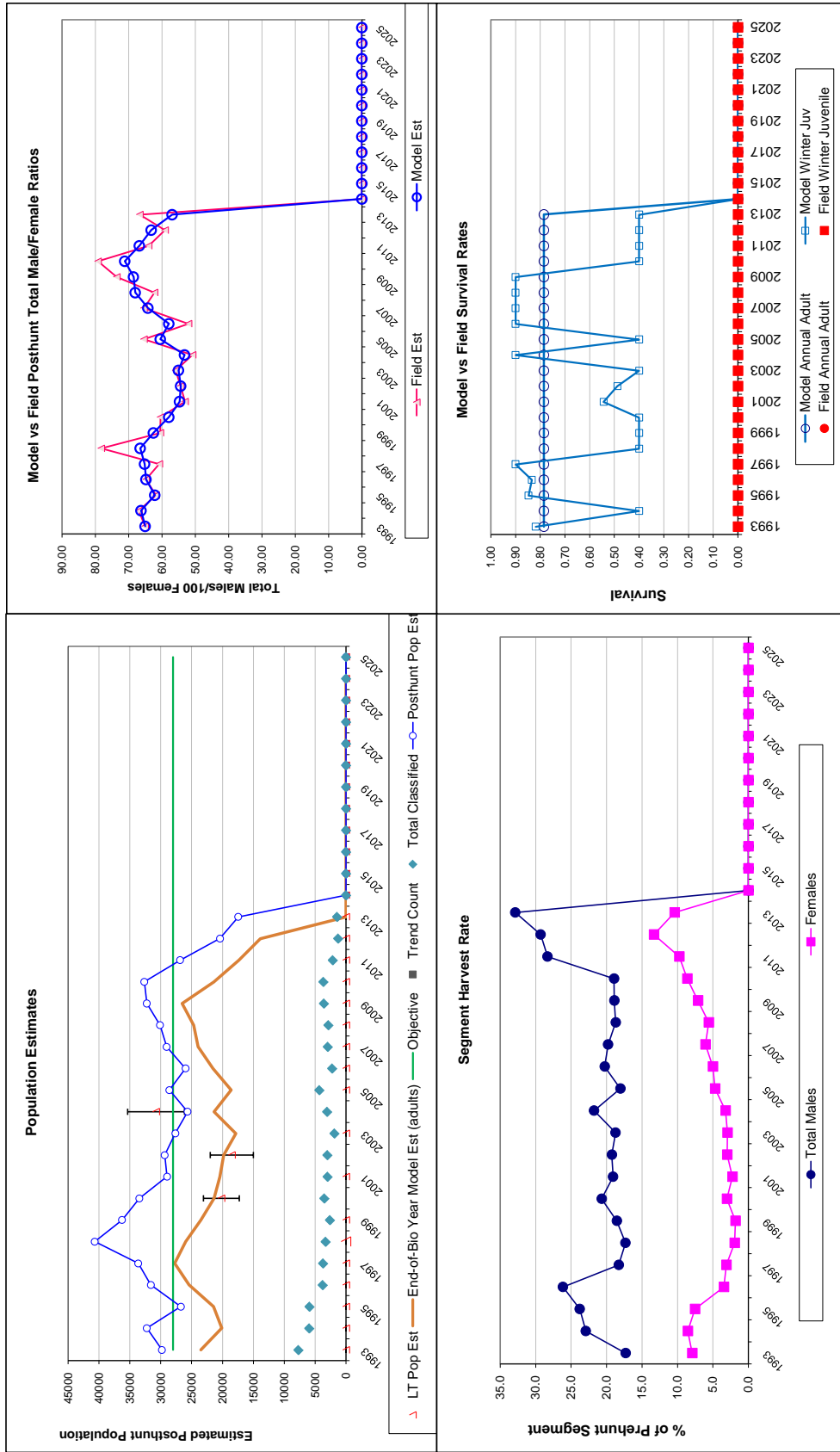
Parameters:		Optim cells
Adult Survival =		0.786
Initial Total Male Pop/10,000 =		0.988
Initial Female Pop/10,000 =		1.519

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult survival	98%

Year	Classification Counts					Harvest				
	Juvenile/Female Ratio		Total Male/Female Ratio			Males		Females		Segment Harvest Rate % of
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Males	Females	Juveniles	
1993		51.08	1.47	65.07	65.07	1.74	1555	1093	82	17.3
1994		91.92	2.77	66.26	66.93	2.20	1914	1077	176	22.9
1995		81.92	2.48	62.20	61.74	2.03	1634	831	166	23.8
1996		104.05	3.89	64.79	64.79	2.76	1966	401	56	26.2
1997		73.14	2.82	65.21	60.82	2.48	1636	424	47	18.3
1998		96.43	3.97	66.58	78.24	3.40	1713	285	28	17.3
1999		83.10	3.77	62.56	60.50	3.01	1651	257	40	18.6
2000		86.91	3.38	57.94	60.45	2.61	1590	400	35	20.7
2001		72.82	3.07	54.72	53.09	2.48	1284	278	38	19.1
2002		85.77	3.56	54.37	54.37	2.58	1235	353	18	16.06
2003		79.90	4.25	55.07	55.90	3.31	1173	334	66	15.73
2004		87.02	3.56	53.26	50.82	2.44	1204	334	61	18.7
2005		75.35	2.71	60.51	65.42	2.46	1295	555	85	21.8
2006		84.33	4.04	57.94	52.05	2.88	1233	525	38	18.1
2007		81.17	3.50	64.26	65.42	3.00	1486	708	84	20.3
2008		66.67	2.98	68.04	62.26	2.85	1618	711	99	19.8
2009		76.99	3.09	68.56	73.57	2.99	1689	926	35	22.78
2010		67.05	2.74	71.17	79.19	3.09	1861	1188	135	18.7
2011		76.31	3.88	66.79	64.02	3.43	2163	1113	105	18.9
2012		66.31	4.41	63.25	59.08	4.07	1756	1260	153	28.3
2013		75.00	4.68	56.97	66.67	4.30	1475	820	100	29.3
2014										32.9
2015										
2016										
2017										
2018										
2019										
2020										
2021										
2022										
2023										
2024										
2025										



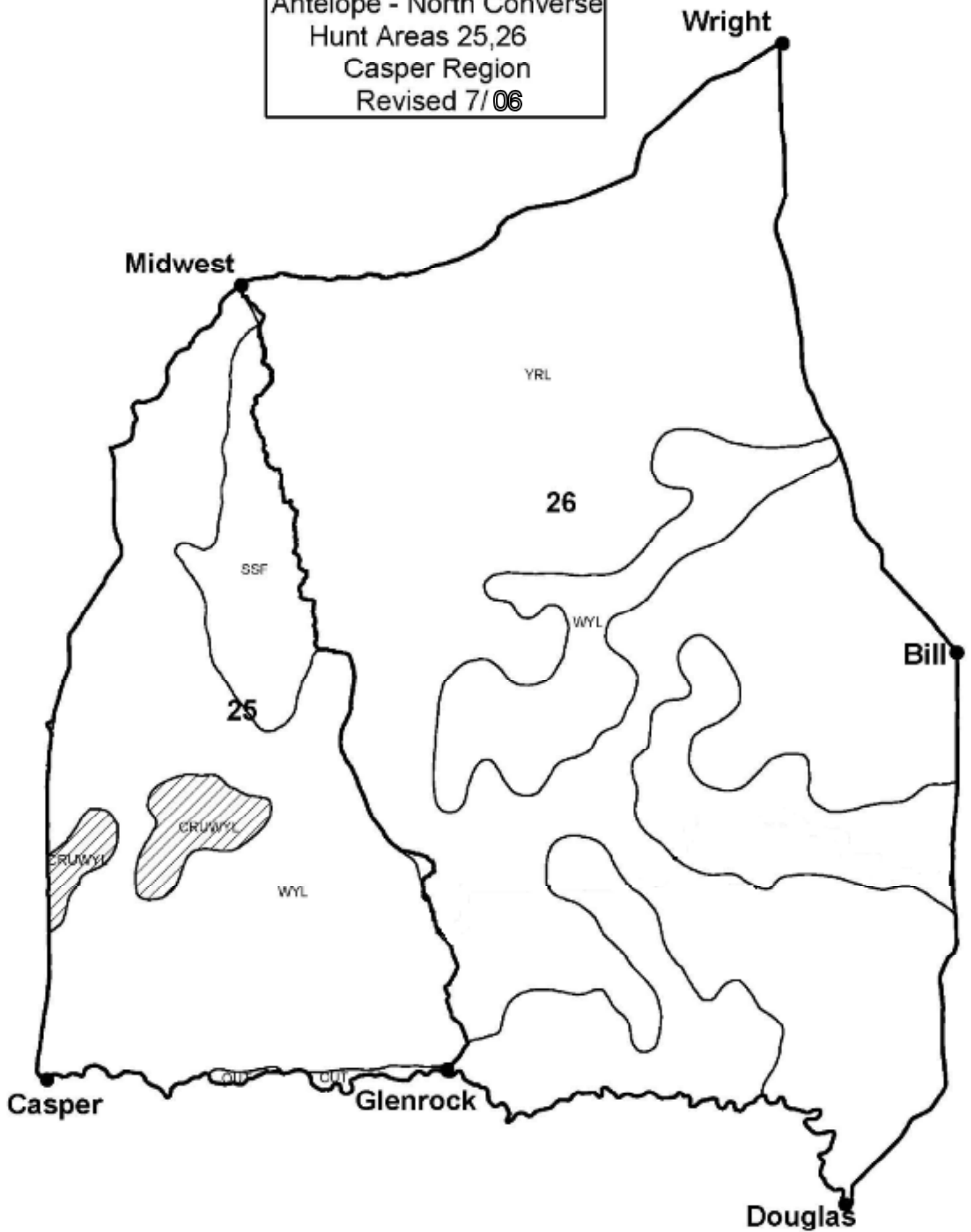
FIGURES



Comments:

END

Antelope - North Converse  
Hunt Areas 25,26  
Casper Region  
Revised 7/06



## 2012 JCR Evaluation Form

Species: Mule Deer

Period: 6/1/2012 - 5/31/2013

Herd: MD740 - CHEYENNE RIVER

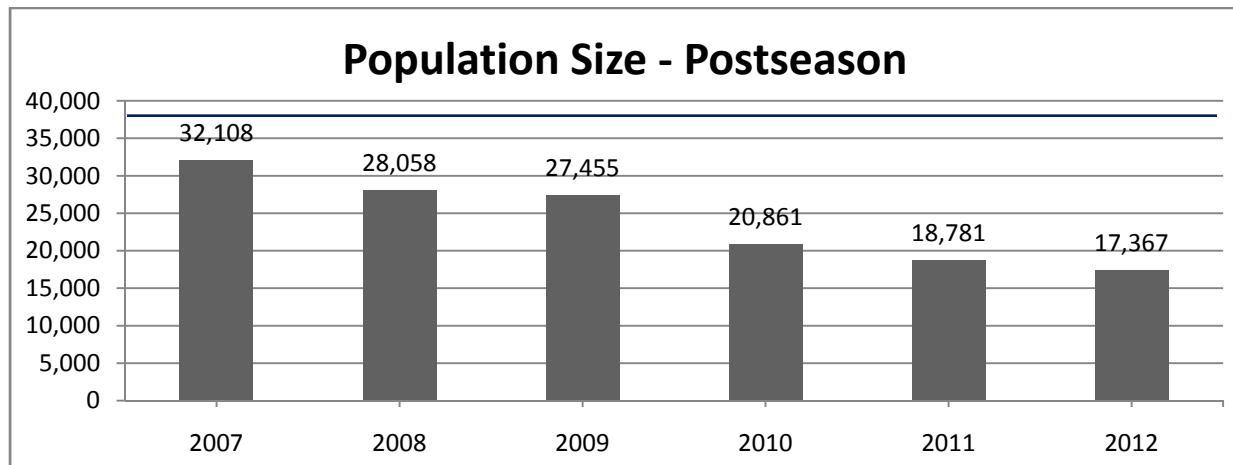
Hunt Areas: 7-14, 21

Prepared By: JOE SANDRINI

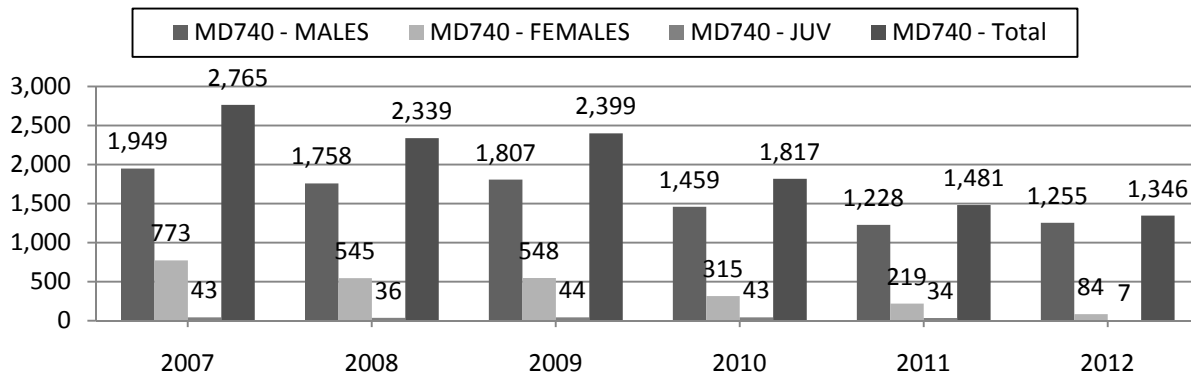
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	25,453	17,367	17,678
Harvest:	2,160	1,346	1,193
Hunters:	3,319	2,511	2,210
Hunter Success:	64%	53%	54%
Active Licenses:	3,483	2,581	2,305
Active License Percent:	61%	52%	52%
Recreation Days:	13,824	10,479	9,805
Days Per Animal:	6.1	7.8	7.6
Ratio Males per 100 Females	37	33	
Ratio Juveniles per 100 Females	61	44	
Population Objective:			38,000
Management Strategy:			Recreational
Percent population is above (+) or below (-) objective:			-53.0%
Number of years population has been + or - objective in recent trend:			12
Model Date:			02/14/2013

### Proposed harvest rates (percent of pre-season estimate for each sex/age group):

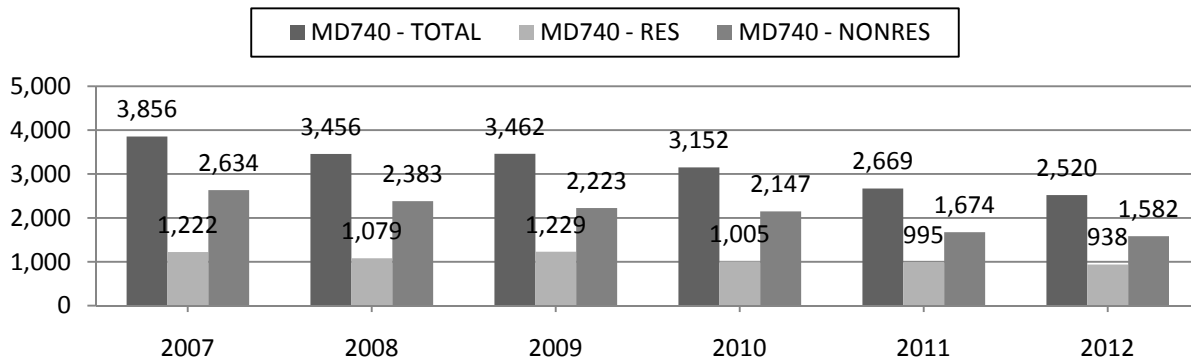
	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	0.9%	0.4%
Males ≥ 1 year old:	29.3%	30.3
Juveniles (< 1 year old):	0.2%	0.1%
Total:	7.9%	6.9%
Projected change in post-season population:	-7.5%	+1.8%



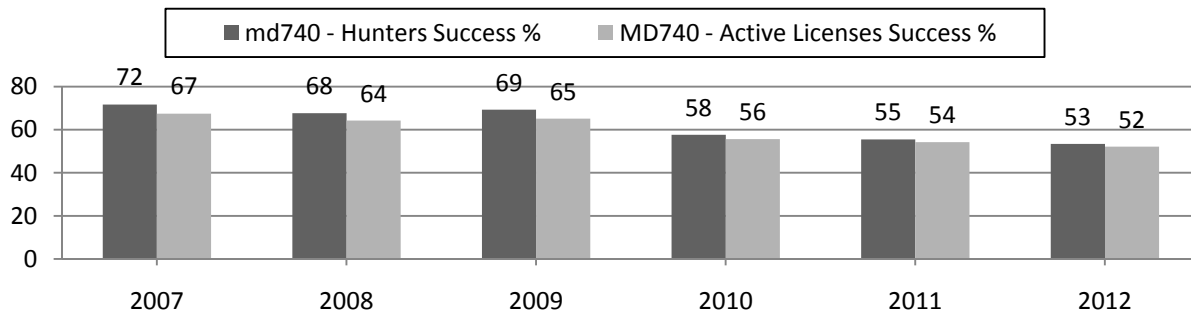
## Harvest



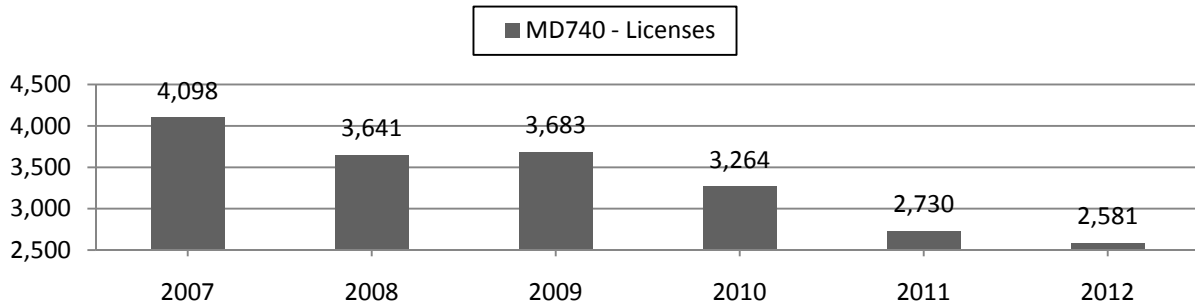
## Number of Hunters



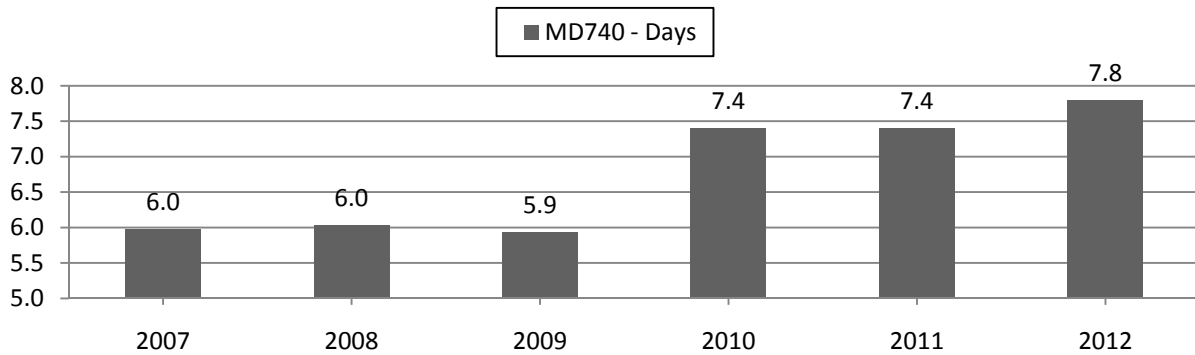
## Harvest Success



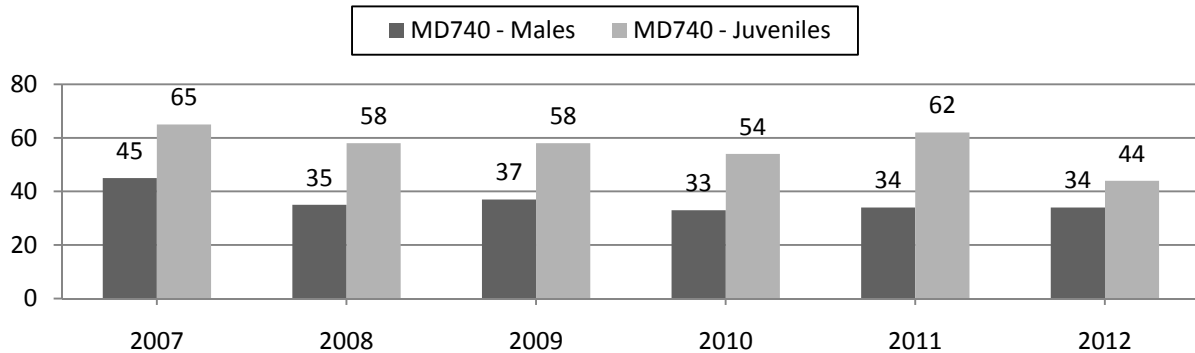
### Active Licenses



### Days Per Animal Harvested



### Postseason Animals per 100 Females



2007 - 2012 Postseason Classification Summary \*

for Mule Deer Herd MD740 - CHEYENNE RIVER

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2010	20,863	0	0	0	0%	0	0%	0	0%	0	1,145	0	0	0	± 0	0	± 0	0
2011	18,784	113	281	394	17%	1,155	51%	711	31%	2,260	970	10	24	34	± 2	62	± 4	46
2012	17,367	119	185	304	19%	932	57%	406	25%	1,642	1,201	13	20	33	± 3	44	± 3	33

\* JCR database information only available since herd unit was created. Other charts in this report were created from raw data in stand alone excel file.

**2013 HUNTING SEASONS  
CHEYENNE RIVER MULE DEER HERD (MD740)**

Hunt Area	Type	Season Dates		Quota	Limitations
		Opens	Closes		
7		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
8		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
9		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
10		Oct. 1	Oct. 7		General license; antlered mule deer three (3) points or more on either antler or any white-tailed deer
11		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
12		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
	6	Oct. 1	Nov. 30	50	Limited quota licenses; doe or fawn
13		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
14		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
15		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
21		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
Archery		Sept. 1	Sept. 30		Refer to license type and limitations in Section 3

**Region B Nonresident Quota: 1,500**

Hunt Area	License Type	Quota change from 2012
8	6	-25
11	6	-25
12	6	-25
13, 14	7	-25
21	6	-25
Herd Unit Total	6	-100
	7	-25
	Region B	-200

### **Management Evaluation**

**Current Management Objective:** 38,000

**Management Strategy:** Recreational

**2012 Postseason Population Estimate:** ~ 17,400

**2013 Proposed Postseason Population Estimate:** ~ 17,700

**HERD UNIT ISSUES:** The Cheyenne River mule deer herd was created in 2009 by combining the Thunder Basin and Lance Creek herds. The postseason population objective is 38,000, a combination of the parent herds' objectives. The herd is managed for recreational hunting; and the management objective for this herd is scheduled to be reviewed during the 2013 bio-year.

There are about 6,350 mi<sup>2</sup> in this herd unit, and 5,485 mi<sup>2</sup> (86%) are considered occupied habitat. Approximately 75% of the land within the herd unit is privately owned, with the remaining lands administered by the United States Forest Service, Bureau of Land Management, or the State of Wyoming. As a result, hunter access is largely limited and controlled by landowners, and access fees along with outfitted hunting are common. Consequently, hunting pressure can be heavy on accessible public land. About two-thirds of the hunters pursuing mule deer in this herd unit are nonresidents. These nonresidents typically are more willing to pay trespass or access fees for hunting privileges on private land; or they hire an outfitter. Hunt Areas (HA) 8, 10, and 13 are the only areas containing large blocks of accessible public land, which most of the resident hunters seek. These hunt areas typically receive heavy hunting pressure throughout the season.

Primary land uses within the herd unit includes livestock grazing, oil and gas production, and some crop production. By far, the dominate land use throughout the herd unit is livestock grazing. The majority of oil and gas development occurs in the western and north central portions of the herd unit. However, substantial new oil and gas development is occurring in the central portions of the herd unit in northwest Niobrara County (HA 11) and significantly increased development is occurring near Douglas (HA 14). There are several large surface coal mines in HA 10 and HA 21, which create a high level of disturbance. In addition, coal bed methane development over a large portion of these same two hunt areas is expected continue to increase disturbance. Cultivation of alfalfa, hay, oats, and wheat occur mostly in the southern and eastern portions of the herd unit.



**WEATHER:** Drought in 2007, combined with poor habitat conditions and more normal winter weather, reduced recruitment. Since then, annual harvest of antlerless deer has dropped, but more severe late winter and early spring weather also beset the herd. The winter of 2010-11 was very harsh in the northern half of the herd unit, and the 2012 summer was the driest on record. The warm, dry conditions that beset the area during the end of bio-year 2011 continued through the 2012-13 winter. April of 2013 finally saw a break in the pattern of drought when temperatures dropped below normal for the entire month, and significant precipitation was again received (<http://www.ncdc.noaa.gov/temp-and-precip/>). Overall, the weather pattern during bio-year 2012 resulted in poor forage production, very low recruitment, and average over-winter survival of all age classes of mule deer. Tougher winter and spring conditions combined with dry summers have likely reduced fawn productivity and survival, and this is considered to be the proximate factor influencing this population's continued decline.

**HABITAT:** Sagebrush (*Artemisia ssp.*) steppe and sagebrush grasslands with scattered hills dominated by ponderosa pine (*Pinus ponderosa*) dominate most of the western, central, and northern segments of the herd unit. The eastern most lands in the herd unit are comprised of short grass prairie punctuated by the previously mentioned pine breaks, and there is a small area (45 mi<sup>2</sup>) of southern Black Hills habitat along the Stateline near Newcastle. Rolling ponderosa pine and limber pine (*Pinus flexilis*) hills and ridges dominate the southern portions of the herd unit. Major agricultural crops are grass and alfalfa hay, and winter wheat. Croplands are localized and found primarily southeast of Gillette, near Moorcroft, Upton, Newcastle, Manville, and Lusk. These variations in habitat types and limited riparian areas affect deer densities and distribution throughout the herd unit. The majority of mule deer are typically found utilizing broken topography characterized by conifer covered hills, or cottonwood and sagebrush dominated riparian communities. Scattered mule deer are found in the open sagebrush-grassland areas.

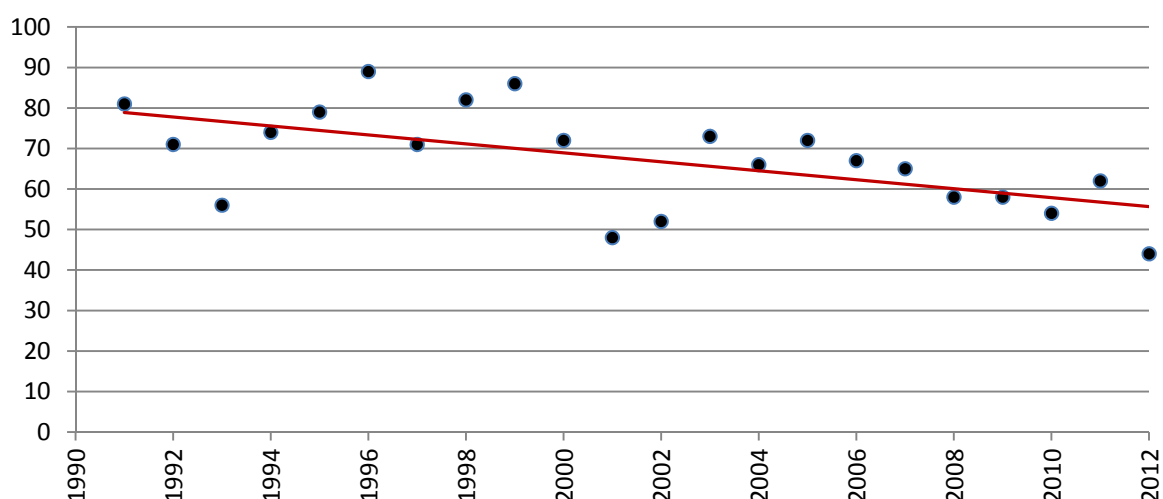
Several major cottonwood riparian drainages traverse the herd unit including the Belle Fourche River and Cheyenne Rivers including many of their tributary creeks such as Beaver Creek, Lightning Creek, Twenty-Mile Creek, Lance Creek, and Old Woman Creek. Overstory canopy along these drainages is dominated by decadent stands of plains cottonwood (*Populus deltoides*). The majority of drainages are ephemeral, and free flowing springs are rare. Water developments for livestock have benefited mule deer in this herd unit. Coal bed methane development has increased water availability near Wright and Gillette, but this water's quality and effects on the mule deer population are unknown.

The declining health and/or loss of shrub stands is a concern in this herd unit as evidenced from Wyoming big sagebrush leader growth and utilization measurements taken on established transects. In recent years, only utilization has been measured. In 2006 & 2007, drought coupled with grazing and browsing by wild and domestic animals, negatively impacted winter food availability. Conditions improved slightly between 2008 and 2010, but observed fawn:doe ratios were low, which was likely due to more normal to severe winter and spring weather patterns. Shrub condition and forb production declined substantially in 2012, when severe drought impeded growth and the fawn:doe ration plummeted.

The overall lack of cottonwood regeneration is also a concern in this herd unit. Photo-point transects have shown some dramatic losses of seedling and young cottonwood trees. These

losses have been primarily attributed to livestock grazing and beaver, and to a lesser extent by deer and elk. The health and vigor of riparian cottonwood communities and shrub stands needs to be enhanced if mule deer are going to thrive in this part of Wyoming.

**FIELD DATA:** While postseason fawn:doe ratios have undergone cyclical fluctuations, they have generally trended downward (Figure 1). Since 1991, fawn ratios have averaged 67 fawns per 100 does (std. dev. 12), which is below longer-term averages but above the mean of 55:100 observed over the past 5-years. Observed fawn:doe ratios dropped after the harsh winters of 1983-1984; 1992-1993; 2000-2001; and 2007-2008, but increased during the years following each nadir. Following the 2010-2011 winter, which was very severe in the northern one-third of the herd unit, fawn-doe ratios actually increased slightly above the preceding year. The apparent effects of this particular winter being perhaps moderated by a combination of better habitat conditions and fewer deer in the southern two-thirds of the herd unit, and more moderate spring weather with excellent forage production – parameters that did not present themselves following the other winters mentioned. However, extreme drought in 2012 manifested itself in the lowest fawn:doe ratio observed in this Herd Unit in recent history.



**Figure 1. Post-Season Fawn:Doe Ratios: Cheyenne River Mule Deer Herd (1991 – 2012).**

While productivity in this herd unit, as measured by fawn:doe ratios, has declined since the early 1980's, poor reproduction was not considered to be limiting in this herd until recently. Prior to 2009, lower productivity may have been a blessing, as difficult access to private land for hunters limited our ability to regulate deer numbers through sport hunting, and habitat conditions had become poor. At the time, area managers strongly believed the observed decrease in productivity was linked primarily to declines in overall quality and quantity of sagebrush and riparian habitat within the herd unit. However, beginning in 2009, weather conditions moved away from drought, and with reduced numbers of both domestic livestock and wild ungulates across the range, shrub conditions began to improve, but fawn:doe ratios remained suppressed. During this time frame more normal to severe winter weather was experienced and the

populations of small game animals dropped. This may have indirectly increased predation on fawn mule deer. However, it appears fawn:doe ratios in this herd are very sensitive to weather and habitat conditions. Additionally, since about 2006, there have been reports of dead deer each year in the early fall, and Epizootic Hemorrhagic Disease (EHD) was confirmed in a few cases.

Buck:doe ratios in this herd increased between 2003 and 2007, peaking at 45:100. Since then, they have declined and stabilized near the 10-year average (34:100). Until 2008, fair productivity coupled with limited access for hunters to private land yielded an increasing buck:doe ratio (despite enhanced license issuance). Since then, fawn production and survival have dropped resulting in a decline in buck ratios. Visibility of yearling bucks is high during classifications, and tracking yearling buck ratios provides managers with a good indication of recruitment into this population, given low harvest rates of yearling bucks.

**HARVEST DATA:** Most harvested mule deer are taken off private land because it provides the majority of mule deer habitat in the Herd Unit. The Department is currently attempting to balance desires of landowners and hunters to increase deer numbers, but still keep the population at levels that will reduce the chance of a large-scale die-off. Access to private lands for deer hunting continues to decrease due to leasing by outfitters and many landowners limiting hunting in the wake of declining deer numbers. Over the past two decades, outfitter control has significantly curtailed access to buck deer, and harvest of bucks dropped when seasons were liberalized in the mid 2000's. The reduced access to private land for deer hunters has increased hunting pressure on bucks on accessible public lands, and resulted in lower numbers of bucks there. Many landowners have stated, even when the population of deer was higher, that they are not willing to host increased numbers of hunters, or tolerate much in the way of doe/fawn hunting. Consequently, we have basically reached access saturation at this time on much of the private land in the herd unit.

Since 2006, hunter numbers and harvest have declined steadily, while hunter effort has increased. Initially, most of the decline in hunter numbers was due to a reduction in the number of non-residents hunting mule deer as the Region B quota has dropped. More recently, there has been a decline in resident hunters. Further, during each of past three hunting seasons, many complaints have been received from both hunters and landowners throughout the herd unit with regards to the low number of deer seen and harvested. It is evident from the reduced number of deer found during classification efforts, changes in harvest statistics, and landowner contacts that this herd declined substantially over the past three years.

**POPULATION:** The 2012 post-season population estimate for this herd was ~17,400. The population model suggests this population peaked near objective in 2000 and then dropped dramatically following the tough winter of 2000. The herd is projected to have rebounded between 2002 and 2006. It leveled off in 2007 at about 15% below objective, and has declined since.

The Semi-Constant Juvenile / Semi-Constant Adult (SCJ SCA) model was chosen to estimate this herd's population. It was selected over competing models because it had the lowest relative AICc (74), and model fit with observed buck ratios was very good. This model is also well correlated with changes in harvest statistics, as changes in preseason population estimates are

91% correlated with changes in hunter success, and inversely correlated 83% with changes in hunter effort since 2007. Modeled changes in population size also mirror impressions of field personnel and many landowners. Overall, this model is considered to be of good quality because it has 15<sup>+</sup> years of data; ratio data are available for all years in model; juvenile and adult survival data were obtained from similar herds; it aligns fairly well with observed data; and results are biologically defensible.

**MANAGEMENT SUMMARY:** The traditional season dates for this herd unit are Oct. 1-15. In order to facilitate population growth commensurate with landowner desires, we have eliminated most doe/fawn harvest and continue antlered only General License seasons. Limited doe/fawn harvest will continue in HA 12, where a couple landowners are experiencing some damage and want to reduce mule deer numbers, and in the eastern quarter of HA 9 to allow landowners concerned with damage on Stockade Beaver Creek to address the issue if they choose.

Due to intense hunting pressure on public land there is a discrepancy in deer numbers and densities between private and public land areas. This is best exemplified in HA 10, which contains the highest proportion of public land in the herd unit. To address low buck numbers and hunter crowding in this area, we have been steadily reducing the Region B quota, running a short hunting season, and implemented a 3-point restriction in 2012. The combined strategy of limiting Region B licenses and conservative hunting seasons may be helping. The buck:doe ratio improved in HA 10 to the herd-wide average in 2009 and 2010, but deer densities remained depressed. However, in 2011, the observed buck:doe ratio in area 10 dropped to 16:100, as did the number of deer observed per hour of classification flight time. This led to the 3-point restriction implemented in 2012, and the post-season buck:doe ratio improved to 42:100 in 2012, but only 27 bucks were observed in over 4 hours of helicopter flight time post-season 2012.

Many landowners have stated they are not taking deer hunters this year, or are reducing the number they host. In addition, harvest statistics from HA 10 suggest non-resident hunters have outnumbered resident hunters 2:1 on public land, and as such the Region B quota has again been reduced. The Region B quota of 1,500 should allow all 1<sup>st</sup> choice applicants to draw a license; and the 2013 hunting season should result in harvest of about 1,150 bucks and 40 antlerless deer. Given average productivity and modeled survival rates, this harvest will essentially keep the post-season population unchanged into post-season 2013.

<b>INPUT</b>	
Species:	Mule Deer
Biologist:	Joe Sandrini
Herd Unit & No.:	Cheyenne R.
Model date:	02/14/13

MODELS SUMMARY				Notes
			Relative AICc	
			Fit	
C,J,CA	Constant Juvenile & Adult Survival		105	
SC,J,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival		33	
TS,J,CA	Time-Specific Juvenile & Constant Adult Survival		11	

Population Estimates from Top Model												
Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population			Total	Predicted Posthunt Population			Total	Objective
	Field Est	Field SE		Juveniles	Total Males	Females		Juveniles	Total Males	Females		
1995				10622	5728	14048	30398	10532	3558	13285	27375	38000
1996				12381	6413	14499	33294	12350	4112	13897	30360	38000
1997				10682	7471	15604	33758	10629	5118	14968	30714	38000
1998				12707	7742	15929	36378	12664	4916	15405	32985	38000
1999				13847	8242	16961	39050	13786	4783	16021	34591	38000
2000				14360	10508	20623	45492	14301	7050	19750	41100	38000
2001				7712	7795	16685	32192	7625	4811	15774	28210	38000
2002				7748	6501	15614	29863	7682	3769	14763	26214	38000
2003				10290	5654	14792	30736	10208	3411	14002	27621	38000
2004				9474	6185	14989	30648	9419	4033	14290	27742	38000
2005				10314	6444	14969	31726	10210	4440	14224	28875	38000
2006				10513	8286	16418	35216	10479	6119	15631	32229	38000
2007				10193	8525	16431	35149	10146	6381	15581	32108	38000
2008				8318	7333	14980	30631	8278	5399	14381	28058	38000
2009				8220	7204	14670	30094	8172	5217	14067	27455	38000
2010				6084	5286	11481	22851	6037	3681	11144	20861	38000
2011				5913	4558	9782	20252	5876	3359	9546	18781	38000
2012				4264	4720	9863	18848	4256	3340	9771	17367	38000
2013				5299	4173	9518	18990	5294	2907	9477	17678	38000
2014												38000
2015												38000
2016												38000
2017												38000
2018												38000
2019												38000
2020												38000
2021												38000
2022												38000
2023												38000
2024												38000
2025												38000
2026												38000
2027												38000

Survival and Initial Population Estimates

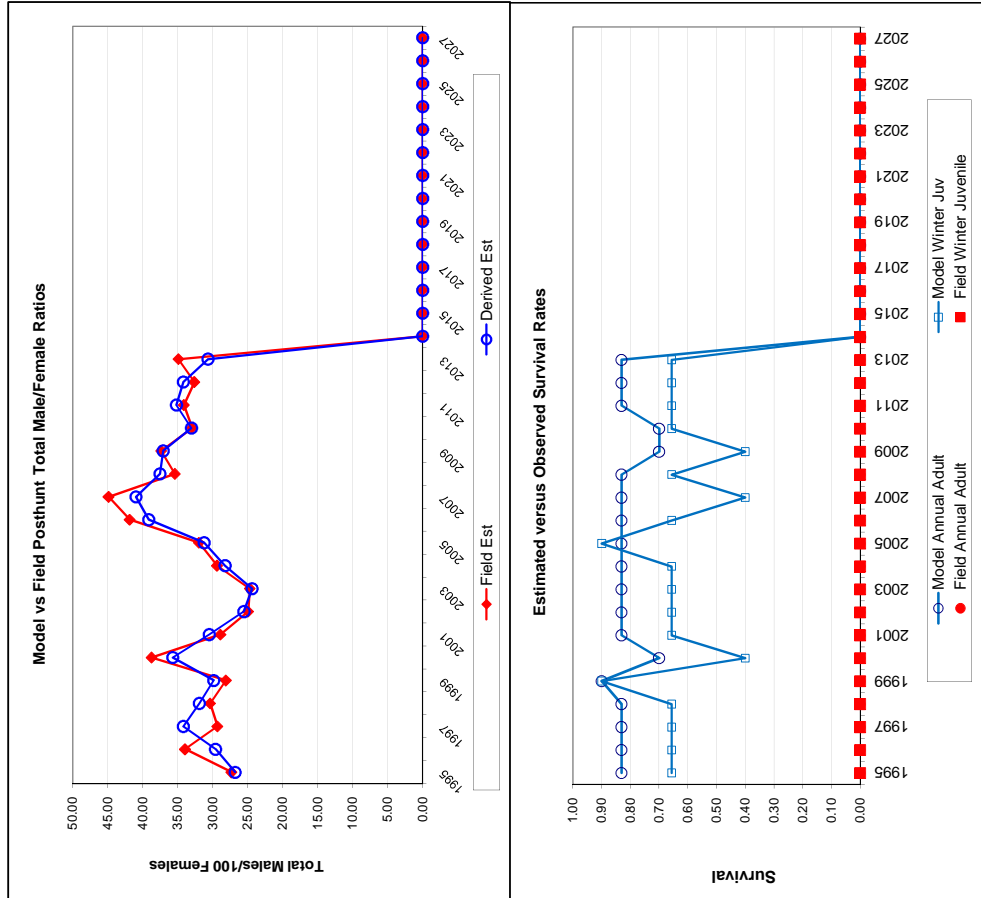
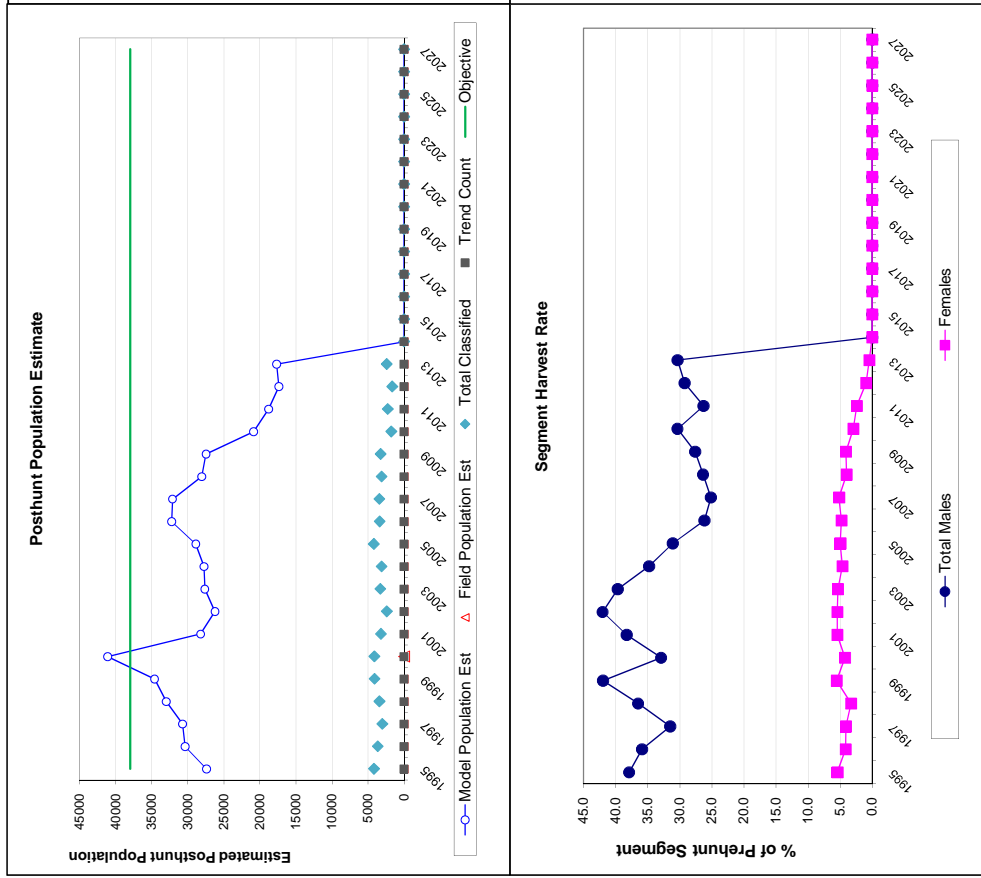
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1995	0.66		0.83	
1996	0.66		0.83	
1997	0.66		0.83	
1998	0.66		0.83	
1999	0.90		0.90	
2000	0.40		0.70	
2001	0.66		0.83	
2002	0.66		0.83	
2003	0.66		0.83	
2004	0.66		0.83	
2005	0.90		0.83	
2006	0.66		0.83	
2007	0.40		0.83	
2008	0.66		0.83	
2009	0.40		0.70	
2010	0.66		0.70	
2011	0.66		0.83	
2012	0.66		0.83	
2013	0.66		0.83	
2014				
2015				
2016				
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2022				
2023				
2024				
2025				
2026				
2027				

<b>Parameters:</b>		<b>Optim cells</b>
Juvenile Survival =		0.656
Adult Survival =		0.831
Initial Total Male Pop/10,000 =		0.356
Initial Female Pop/10,000 =		1.329

<b>MODEL ASSUMPTIONS</b>	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

Year	Classification Counts						Harvest			
	Juvenile/Female Ratio			Total Male/Female Ratio			Segment Harvest Rate (% of			
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Males	Females	Total Harvest
1995		79.28	2.65	26.78	27.32	1.31	82	1973	693	2748
1996		88.87	3.20	29.59	33.94	1.67	28	2092	547	2667
1997		71.01	2.84	34.20	29.32	1.59	49	2139	579	2767
1998		82.20	3.05	31.91	30.37	1.57	39	2569	476	3084
1999		86.05	2.89	29.85	28.11	1.37	55	3145	854	4054
2000		72.41	2.53	35.70	38.72	1.66	54	3144	794	3992
2001		48.34	1.99	30.50	28.88	1.44	79	2713	828	3620
2002		52.04	2.42	25.53	24.94	1.52	60	2484	773	3317
2003		72.90	2.75	24.36	24.70	1.36	75	2039	718	2832
2004		65.91	2.62	28.22	29.38	1.54	50	1956	635	2641
2005		71.78	2.45	31.22	31.96	1.43	94	1821	677	2592
2006		67.04	2.63	39.14	41.85	1.91	31	1970	715	2716
2007		65.12	2.57	40.95	44.86	1.99	43	1949	773	2765
2008		57.57	2.37	37.54	35.39	1.72	36	1758	545	2339
2009		58.09	2.35	37.08	37.35	1.75	44	1807	548	2399
2010		54.17	2.97	33.03	32.95	2.15	43	1459	307	1809
2011		61.56	2.93	35.19	34.11	1.99	33	1090	214	1337
2012		43.56	2.59	34.18	32.62	2.15	7	1255	84	1346
2013		55.85	2.62	30.67	34.89	1.93	5	1151	37	1193
2014										
2015										
2016										
2017										
2018										
2019										
2020										
2021										
2022										
2023										
2024										
2025										
2026										
2027										

FIGURES



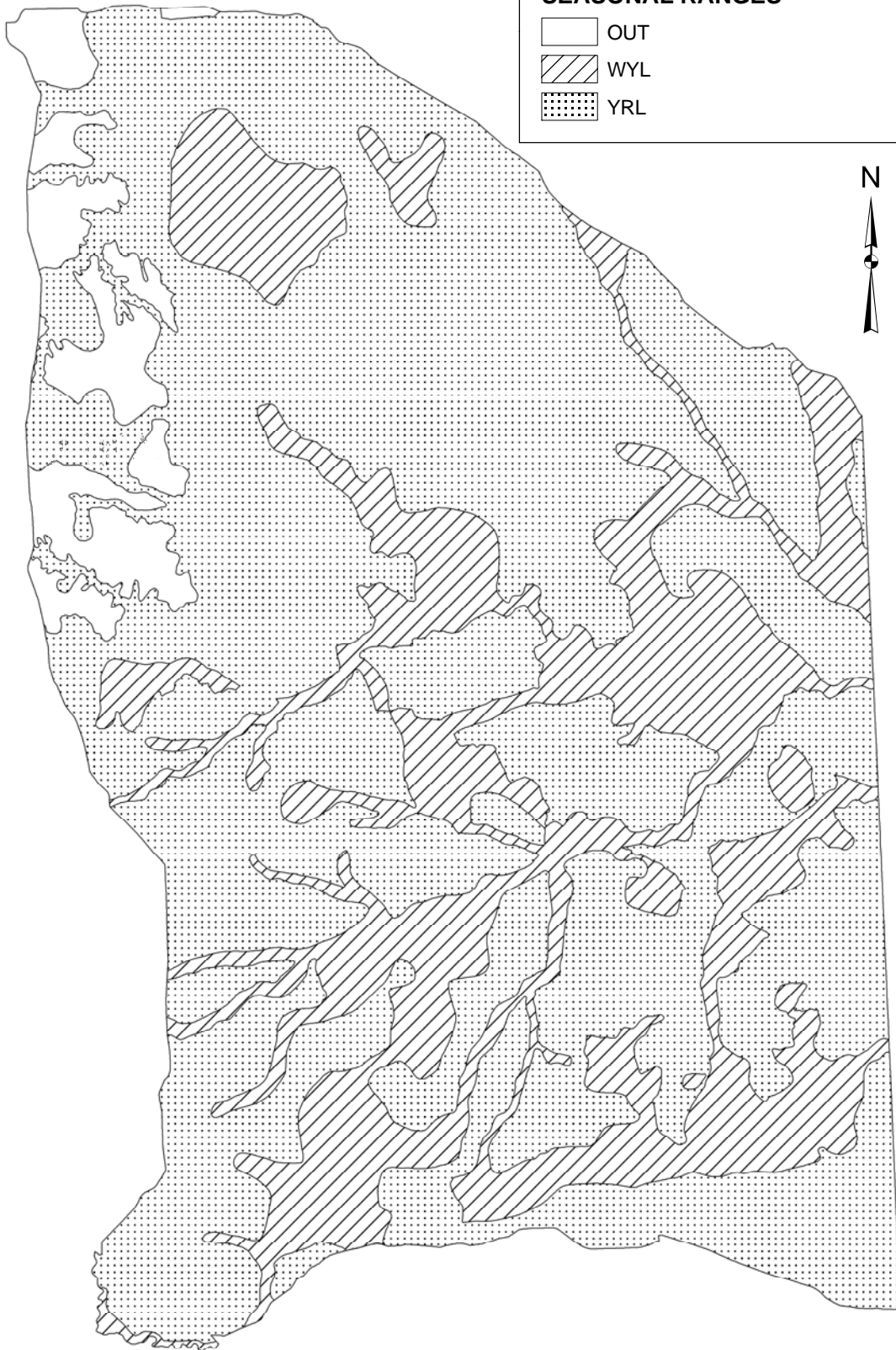
Comments:

END



**Mule Deer (MD 740) Cheyenne River**  
**SEASONAL RANGES**

- OUT  
WYL  
YRL





## 2012 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2012 - 5/31/2013

HERD: MD751 - BLACK HILLS

HUNT AREAS: 1-6

PREPARED BY: JOE SANDRINI

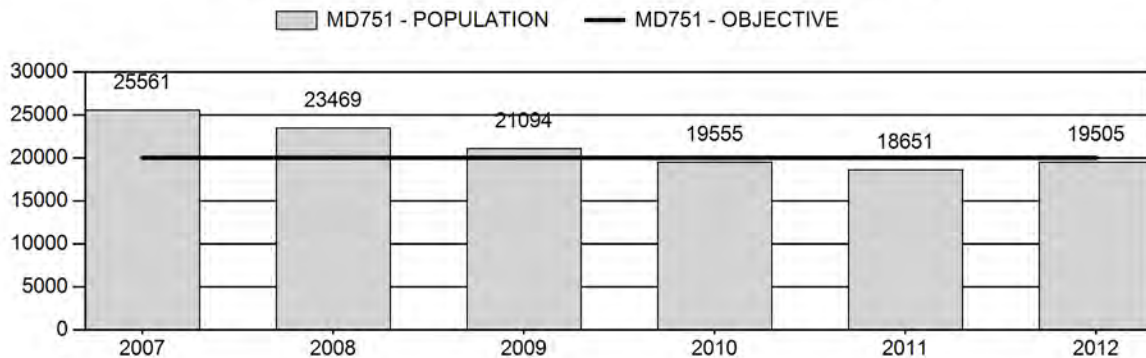
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	21,666	19,505	19,110
Harvest:	2,447	1,442	1,448
Hunters:	5,725	3,569	3,587
Hunter Success:	43%	40%	40%
Active Licenses:	5,983	3,621	3,634
Active License Percent:	41%	40%	40%
Recreation Days:	18,446	11,435	11,471
Days Per Animal:	7.5	7.9	7.9
Males per 100 Females	18	16	
Juveniles per 100 Females	69	76	

Population Objective:	20,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-2.5%
Number of years population has been + or - objective in recent trend:	4
Model Date:	04/09/2013

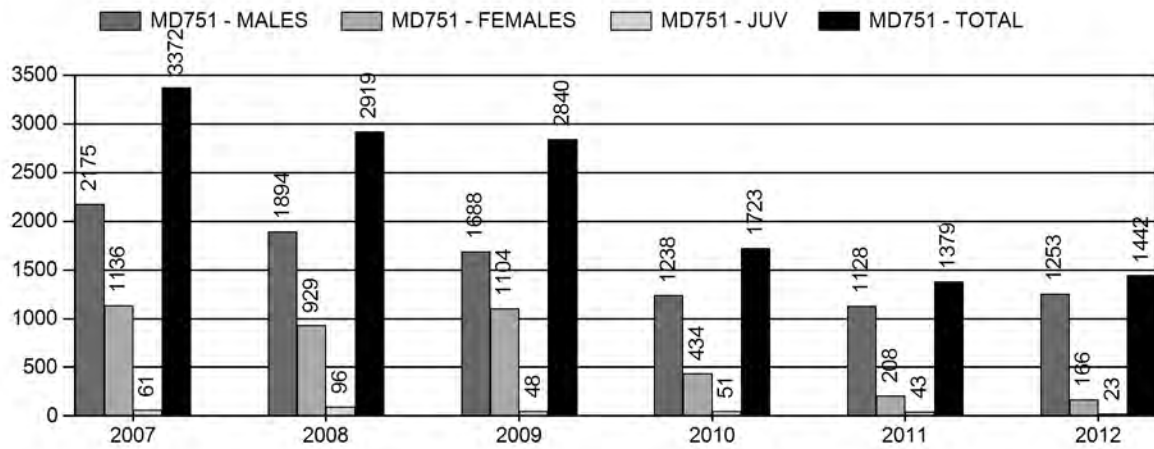
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq$ 1 year old:	1.8%	1.8%
Males $\geq$ 1 year old:	45.6%	44.1%
Juveniles (< 1 year old):	0.3%	0.4%
Total:	7.5%	7.7%
Proposed change in post-season population:	+4.6%	-2.0%

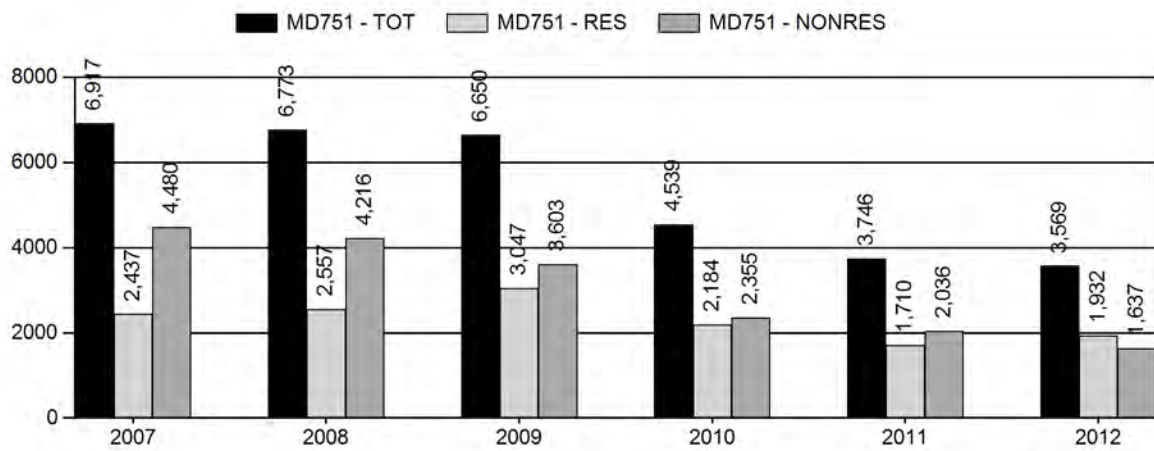
## Population Size - Postseason



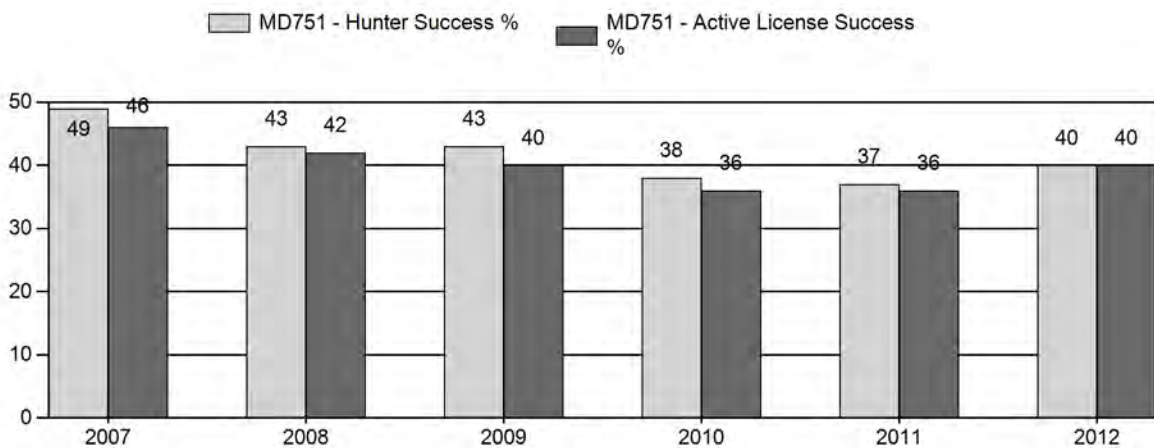
## Harvest



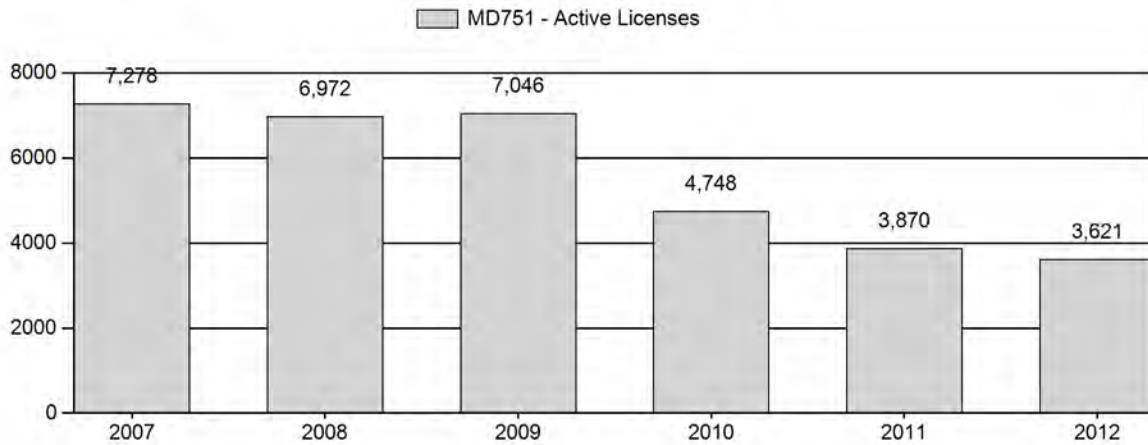
## Number of Hunters



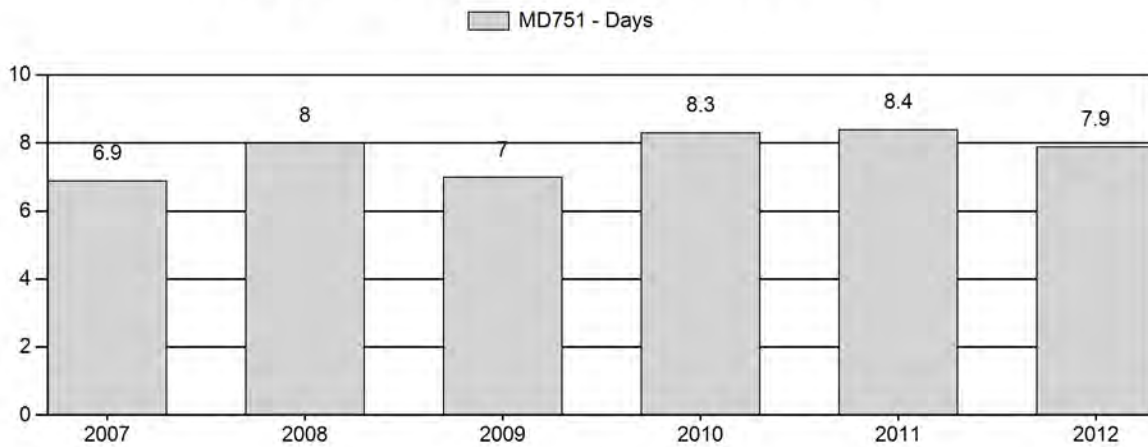
## Harvest Success



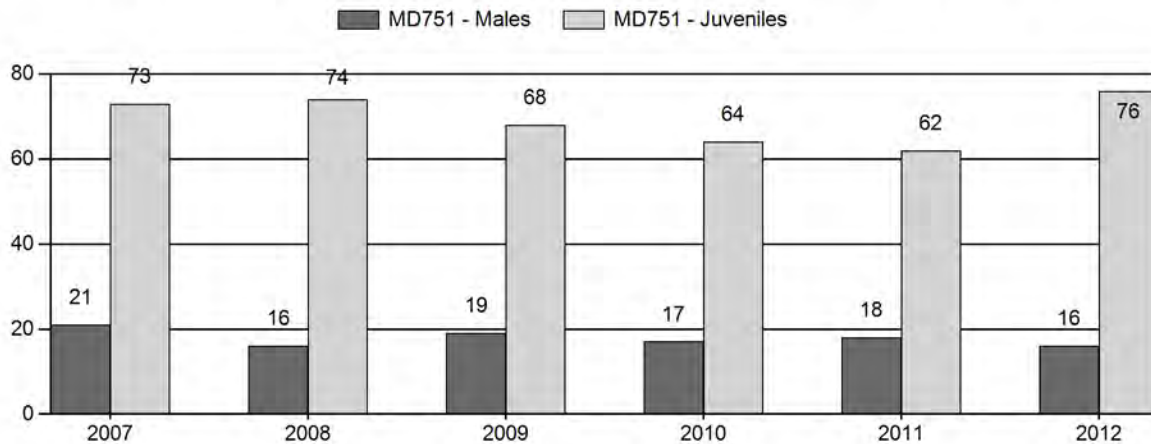
## Active Licenses



## Days per Animal Harvested



## Postseason Animals per 100 Females



## 2007 - 2012 Postseason Classification Summary

for Mule Deer Herd MD751 - BLACK HILLS

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	25,561	76	108	184	11%	856	52%	622	37%	1,662	1,515	9	13	21	± 2	73	± 5	60
2008	23,469	73	103	176	9%	1,085	52%	806	39%	2,067	1,505	7	9	16	± 2	74	± 4	64
2009	21,094	48	52	100	10%	522	53%	357	36%	979	1,317	9	10	19	± 3	68	± 6	57
2010	19,555	44	71	115	10%	659	55%	421	35%	1,195	1,174	7	11	17	± 2	64	± 5	54
2011	18,651	41	76	117	10%	658	56%	406	34%	1,181	1,118	6	12	18	± 2	62	± 5	52
2012	19,505	58	70	128	8%	787	52%	596	39%	1,511	1,553	7	9	16	± 2	76	± 5	65

**2013 HUNTING SEASONS  
BLACK HILLS MULE DEER HERD (MD751)**

<b>Hunt Area</b>	<b>Type</b>	<b>Season Dates</b>		<b>Quota</b>	<b>Limitations</b>
<b>Opens</b>	<b>Closes</b>				
1		Nov. 1	Nov. 22		General license; antlered deer off private land; any deer on private land
1, 2, 3	6	Nov. 1	Nov. 22	25	Limited quota licenses; doe or fawn valid on private land
2		Nov. 1	Nov. 22		General license; antlered deer off private land; any deer on private land
3		Nov. 1	Nov. 22		General license; antlered deer off private land; any deer on private land
4		Nov. 1	Nov. 20		General license; antlered deer off private land; any deer on private land except the lands of the State of Wyoming's Ranch A property shall be closed
4	6	Nov. 1	Nov. 20	150	Limited quota licenses; doe or fawn valid on private land
5		Nov. 1	Nov. 20		General license, antlered deer off private land; any deer on private land
	6	Nov. 1	Nov. 20	25	Limited quota licenses; doe or fawn
6		Nov. 1	Nov. 20		General license; antlered deer off private land; any deer on private land
6, 9	6	Nov. 1	Nov. 20	25	Limited quota licenses; doe or fawn valid in those portions of Area 6 and Area 9 east of U.S. Highway 85
Archery		Sept. 1	Sept. 30		Refer to license type and limitations in Section 3

**Region A Nonresident Quota: 2,750**

Hunt Area	License Type	Quota change from 2012
Herd Unit Totals	All	None
	Region A	None

### **Management Evaluation**

**Current Postseason Population Management Objective:** 20,000

**Management Strategy:** Recreational

**2012 Postseason Population Estimate:** ~ 19,500

**2013 Proposed Postseason Population Estimate:** ~ 19,100

**HERD UNIT ISSUES:** The management objective of the Black Hills Mule Herd Unit is an estimated post-season population of 20,000 mule deer, and herd's management strategy is recreational management. It is managed for recreational hunting to limit deer numbers to a level compatible with landowner desires. The population objective and management strategy were set in 1986. The objective and management strategy are scheduled for review during bio-year 2014.

The Black Hills mule deer herd unit encompasses 3,181 mi<sup>2</sup> of occupied habitat. Seventy-six percent of the land in this herd unit is privately owned. Significant blocks of accessible public land are found on the Black Hills National Forest in Hunt Area (HA) 2 and HA 4, and on the Thunder Basin National Grassland in HA 6. A block of BLM land with a couple of access points is also present in HA 1. Because the majority of private landowners charge high access fees for hunting, these parcels of public land receive greater hunting pressure than private lands.

Historically, management of this herd has been a by-product of managing the Black Hills White-Tailed Deer Herd. Deer hunting seasons have been primarily structured to address the white-tailed deer population. As with many of the herd units in the eastern half of Wyoming, the Game & Fish Department has tried to maintain deer numbers at levels acceptable to landowners. In the case of these two deer herds, landowners typically feel saturated with white-tailed deer before mule deer become a problem.

**WEATHER:** Drought conditions, which were persistent throughout the Black Hills between 2000 and 2007, began to moderate in 2008. Between 2008 and 2012, annual temperatures were below the previous 30-year average and annual precipitation each year above the previous 30-year average; and 2010 was significantly colder and wetter than both the 30-year and 100-year averages (<http://lwf.ncdc.noaa.gov/temp-and-precip/time-series>). The predominant weather pattern was characterized by generally cool summers, more persistent snow cover in late fall and winter, and above normal spring moisture. Notably, the winter of 2010-11 saw periods of extended low temperatures and persistent, deep snow cover rivaled only five times previous since the late 1890's. This tough winter preceded bio-year 2012, which was one of the driest on record. Warm and dry conditions beset the area in April of 2012, and continued through the 2012-13 winter. April of 2013 finally saw a break in this pattern when temperatures dropped below normal for the entire month and significant precipitation was again received (<http://www.ncdc.noaa.gov/temp-and-precip/>). Overall, the weather pattern during bio-year 2012 resulted in poor forage production and led to several large wildfires in the southern half of

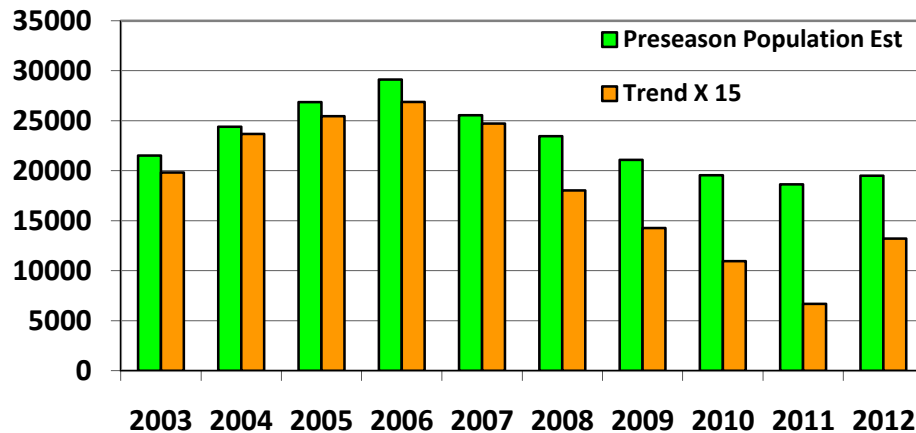


the herd unit. This recent weather pattern resulted in below average recruitment, and about average over-winter survival of all age classes of mule deer.

**HABITAT:** Ponderosa pine (*Pinus ponderosa*) is the dominant overstory species on forested lands. Quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), and bur oak (*Quercus macrocarpa*) stands are present. Important shrubs include big sagebrush and silver sage (*Artemisia spp.*), Saskatoon serviceberry (*Amelanchier alnifolia*), Oregon grape (*Berberis repens*), common chokecherry (*Prunus virginiana*), spiraea (*Spiraea betulifolia*), and true mountain mahogany (*Cercocarpus montanus*). Many non-timbered lands in the DAU are dominated by sagebrush or are used to produce agricultural crops such as winter wheat (*Triticum aestivum*), alfalfa hay (*Medicago sativa*), and grass hay.

Currently, little quantified habitat evaluation is being conducted within this herd unit directly applicable to mule deer. A single true mountain mahogany and two bur oak production and utilization transects have been established. The true mountain mahogany transect is located on mule deer winter range typical of the southern Black Hills, and the bur oak transects are in winter range more typical of white-tailed deer habitat in the northern hills. While little habitat data overall have been collected, it appears drought conditions have negatively affected shrub production, and the peak in mule deer numbers several years ago may have approached what forage conditions could sustain between bio-years 2005 and 2008.

**FIELD DATA:** Between 2002 and 2005, fawn survival was fair, with observed pre-season fawn:doe ratios averaging 67:100. Fawn:doe ratios then increased about 15% the next three years (mean<sub>(2006-2008)</sub> = 77:100) before dropping 16% between 2009 and 2011 (mean<sub>(2009-2011)</sub> = 65:100). Thus, it appears the population decline experienced after 2006 was likely due initially to increased harvest rates and a drop in over-winter survival, while increased non-hunting mortality augmented the decline beginning in 2009. In addition, an usually severe winter in bio-year 2010 and localized epizootic hemorrhagic disease (EHD) outbreaks each of the past five summers have increased annual mortality of all age classes. During the 2007-2010 period, evidence suggests the mountain lion population in the Black Hills reached historically high levels. As a result, harvest, weather conditions, disease, and increased predation have all acted to cause the estimated post-season population to fall 36% between 2006 and 2011. This same period witnessed a 39% decline in the estimated pre-season population, while pre-season trend counts dropped 75% (Figure 1).



**Figure 1. 2003 – 2012 pre-season population estimate produced by TSJ CA model and mule deer observed preseason along trend count routes, increased by a factor of 15.**

As this herd grew rapidly between 1997 and 2000, conservative hunting seasons allowed post-season buck:doe ratios to increase. Then, as Region A license issuance increased, buck:doe ratios declined before leveling off at about 22:100 during a time of good fawn survival. However, as this population began to drop in 2007, buck:doe ratios again dipped. Since 2001, post-season buck:doe ratios in this herd have averaged 20:100 (std. dev = 4), but a mere 16:100 (std. dev.=1) over the past five years. As such, this herd generally exhibits buck:doe ratios at the very bottom end, or below, the Department's management criteria for recreational hunting.

**HARVEST DATA:** Deer seasons in the Black Hills have been traditionally structured to address white-tailed deer management. Consequently, this mule deer herd is managed by balancing white-tailed deer seasons and landowner tolerance for deer (both species) with recreational opportunity. An analysis of harvest information shows the number of hunters in the field pursuing bucks has the greatest impact on total harvest. As such, buck harvest has been regulated by altering non-resident hunter numbers via changes in the Region A quota, while resident buck hunter participation can only be limited by shortening the season – notably by inclusion or removal of the Thanksgiving Day weekend and the days following in November. Department surveys and contacts with non-resident hunters indicate most non-residents want to harvest buck mule deer. This fact, combined with a hunting season that targets bucks during the rut, results in very heavy hunting pressure on buck mule deer. Considering this, and the drop in total buck numbers since 2007, it is prudent to limit harvest of buck mule deer.

With more conservative hunting season structures in place since 2010, mule deer harvest has dropped. At the same time, hunter success has generally declined and effort increased. Hunting seasons the past three years reduced harvest of mule deer bucks 43% from that experienced during the traditional 30 day November season the preceding three years. Comparing these same time periods, resident harvest of mule deer bucks dropped 30%, while non-resident harvest of mule deer bucks dropped 50%. During this time frame, harvest of white-tailed deer bucks declined less (see WD706). Despite these trends, hunter satisfaction essentially remained unchanged for both species the past two years, with about 67% of the hunters reporting they were either satisfied or very satisfied with their Black Hills deer hunt, and 18% reporting they were either dissatisfied or very dissatisfied – regardless of species.

**POPULATION:** The 2012 estimated, post-season population of Black Hills mule deer was about 19,500. The Black Hills mule deer population peaked at an estimated postseason population of around 29,000 mule deer in 2006, and then declined the next five years, and appears to have stabilized slightly below objective. The last substantial population decline this herd experienced was in the mid 1990's. That drop was reversed in 1998 and 1999 when very conservative hunting seasons aligned with excellent fawn survival and mild winters.

Population modeling of this herd is very difficult. The herd unit violates the closed population assumption of the model. Mule deer regularly cross into the Power River Herd Unit, Montana, South Dakota and the Cheyenne River Herd Unit, as no physical barriers exist to prevent movement. Difficulties modeling this herd with POP II were not ameliorated with the change to spreadsheet modeling. The spreadsheet model chosen to estimate this population was the Time Sensitive Juvenile / Constant Adult survival rate model (TSJ CA), because it had the lowest AICc (125) and best fit observed buck:doe ratios. However, this model reached upper or lower constraints on juvenile survival in 8 out of 20 years modeled, and was very close to constraints in 4 additional years. Overall, we consider this model to be of fair to poor quality due to the lack of herd specific survival data, violations of the closed population assumption, below adequate classification sample sizes some years, and aerial classifications in terrain that makes classifying yearling bucks difficult.

**MANAGEMENT SUMMARY:** The spreadsheet model suggests recent postseason populations have been very close to our current management objective of 20,000 mule deer, rather than the approximately 13,000 projected by POP II over the past couple of years – which may or may not be the case. If it is, then our current objective is well below landowner desires. At this time, many landowners have expressed dissatisfaction with the number of mule deer. Based upon habitat conditions and these desires, a season designed to increase this herd is warranted. However, given the low productivity and survival witnessed the past several years, growing the population without nearly closing down buck harvest will not happen. Instead, the 2013 hunting season is designed to allow hunting opportunity identical to 2012. Antlerless harvest on doe/fawn tags has been reduced in recent years with the creation of a type 8 tag valid on private land for doe/fawn white-tailed deer north of I-90; and last fall's hunting season resulted in the take of about 135 antlerless mule deer on General Licenses, and another 55 or so on type 6 doe/fawn tags. This low level of female and juvenile mule deer harvest does not seem to warrant complicating the regulations further, a move opposed by many landowners.

There are no changes to the 2013 mule deer hunting season in the Black Hills. Retention of the November 22<sup>nd</sup> closing date in Hunt Areas 1, 2, & 3 will maintain three full weekends of deer hunting. Staying with a Thanksgiving Day closing date would add another full week and weekend of hunting to the season beyond what has been in place the past three years. The mule deer buck numbers are too depressed to warrant such hunting pressure during the peak of the rut. Continuing with a Region A license quota identical to last year is also intended to limit harvest of mule deer bucks. The proposed season is expected to yield a 2013 postseason population of about 19,100 mule deer, which represents a 2% decrease in the current post-season population. However, the herd will remain within 5% of objective.

<b>INPUT</b>	
Species:	Mule Deer
Biologist:	Joe Sandrini
Herd Unit & No.:	Black Hills
Model date:	04/09/13

MODELS SUMMARY				Notes
	Fit	Relative AICc	Check best model to create report	
C,J,CA	278	287	<input type="checkbox"/> C,J,CA Model	
SC,J,SCA	134	198	<input type="checkbox"/> SC,J,SCA	
TS,J,CA	25	125	<input checked="" type="checkbox"/> TS,J,CA Model	

Population Estimates from Top Model									
Year	Posthunt Population Est. Field Est	Field SE	Trend Count	Predicted Prehunt Population		Predicted Posthunt Population		Objective	
				Juveniles	Total	Juveniles	Total	Females	Total
1995				6573	19197	6511	1928	8147	16585
1996			9750	6570	18936	6549	1761	8601	16912
1997			6750	4092	15581	4057	1263	8331	13651
1998			8835	7241	19104	7208	1363	8727	17299
1999			13530	8751	23874	8738	2530	10509	21777
2000			15780	8331	27355	8310	4098	12614	25023
2001			9225	6659	24316	6611	3004	12133	21747
2002			14715	8300	25411	8263	2638	12110	23010
2003			19830	7692	24592	7619	1971	11935	21524
2004			23685	9234	27992	9172	2365	12875	24413
2005			25455	9490	30547	9421	3307	14148	26877
2006			26880	11825	32704	11726	3234	14174	29133
2007			24720	9678	29267	9611	2721	13226	25558
2008			18030	9184	26677	9078	2167	12221	23466
2009			14280	7784	24216	7731	2057	11304	21092
2010			10965	6920	21447	6863	1945	10743	19552
2011			6690	6458	20166	6411	1848	10390	18649
2012			13215	7719	21091	7694	1652	10159	19505
2013				7154	20703	7129	1750	10231	19110
2014									
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Survival and Initial Population Estimates

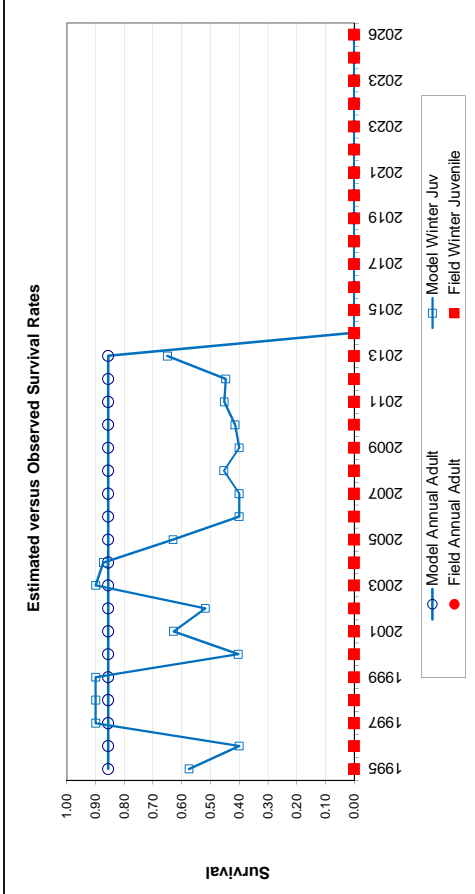
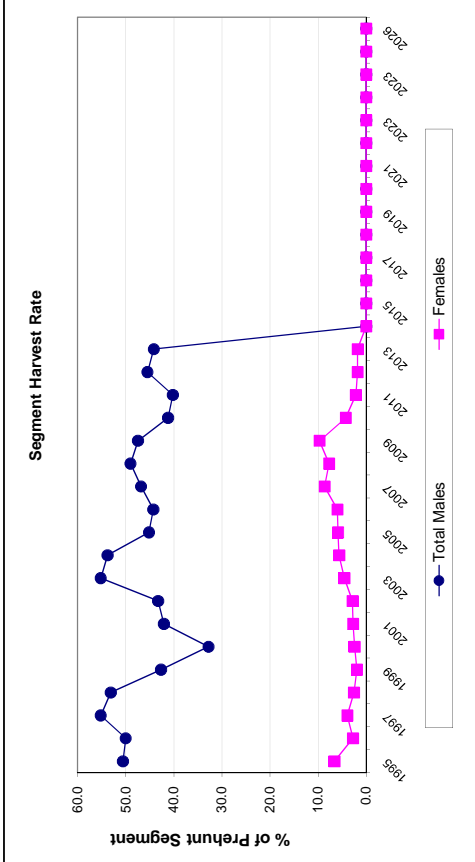
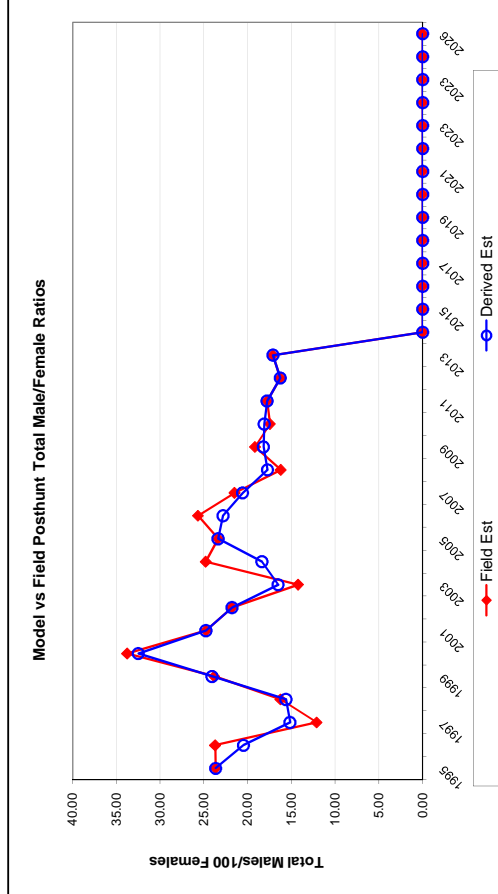
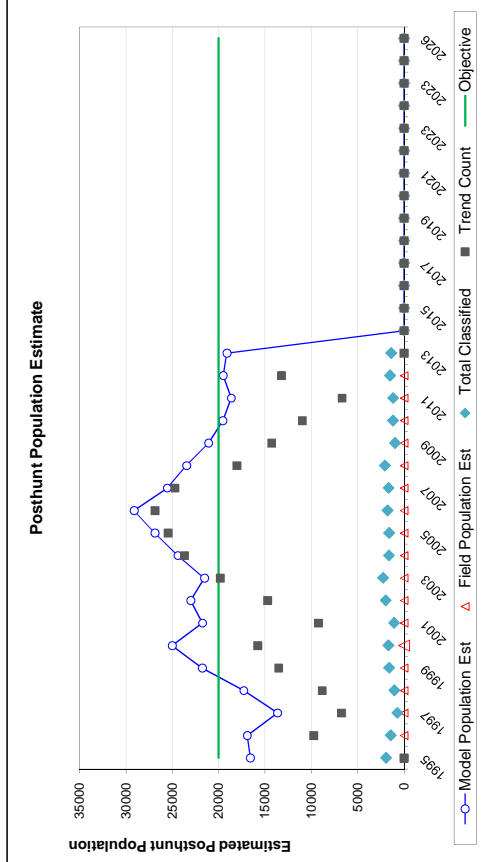
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1995	0.57		0.86	
1996	0.40		0.86	
1997	0.90		0.86	
1998	0.90		0.86	
1999	0.90		0.86	
2000	0.40		0.86	
2001	0.63		0.86	
2002	0.52		0.86	
2003	0.90		0.86	
2004	0.87		0.86	
2005	0.63		0.86	
2006	0.40		0.86	
2007	0.40		0.86	
2008	0.45		0.86	
2009	0.40		0.86	
2010	0.41		0.86	
2011	0.45		0.86	
2012	0.45		0.86	
2013	0.65		0.86	
2014				
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2020				
2021				
2022				
2023				
2024				
2025				
2026				

Parameters:		Optim cells
Adult Survival =		0.856
Initial Total Male Pop/10,000 =		0.193
Initial Female Pop/10,000 =		0.815

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

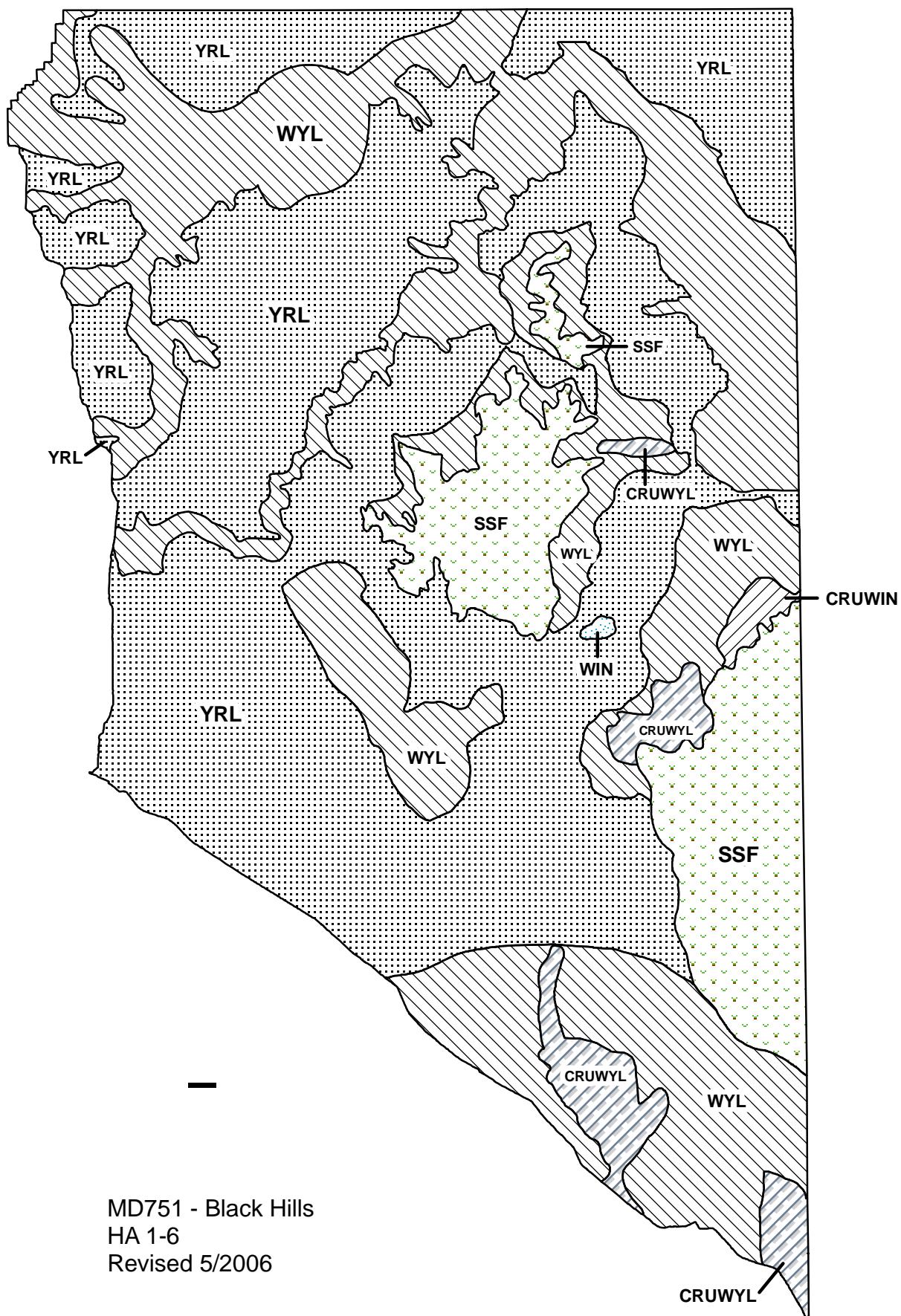
Year	Classification Counts						Harvest			
	Juvenile/Female Ratio			Total Male/Female Ratio			Segment Harvest Rate (% of			
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Males	Females	Total Harvest
1995		79.92	3.89	23.66	23.66	1.75	57	1793	524	2374
1996		76.14	4.31	20.48	23.72	2.02	19	1600	221	1840
1997		48.70	3.96	15.16	12.12	1.72	32	1413	310	1755
1998		82.60	5.37	15.62	16.25	1.90	30	1403	208	1641
1999		83.14	4.43	24.07	23.81	1.95	12	1710	185	1907
2000		65.88	3.60	32.49	33.77	2.31	19	1817	284	2120
2001		54.49	3.74	24.76	24.75	2.26	44	1982	309	2335
2002		68.23	3.32	21.78	21.79	1.60	34	1828	320	2182
2003		63.84	2.87	16.51	14.23	1.13	67	2205	517	2789
2004		71.24	3.83	18.37	24.79	1.93	56	2500	698	3254
2005		66.59	3.62	23.38	23.38	1.85	63	2476	798	3337
2006		82.73	4.20	22.82	25.67	1.94	90	2333	823	3246
2007		72.66	3.83	20.57	21.50	1.75	61	2175	1136	3372
2008		74.29	3.45	17.73	16.22	1.32	96	1884	929	2919
2009		68.39	4.70	18.20	19.16	2.09	48	1688	1104	2840
2010		63.88	3.99	18.10	17.45	1.76	51	1238	434	1723
2011		61.70	3.89	17.78	17.78	1.78	43	1128	208	1379
2012		75.73	4.11	16.26	16.26	1.55	23	1253	166	1442
2013		69.68	3.99	17.10	17.12	1.64	23	1258	167	1448
2014										
2015										
2016										
2017										
2018										
2019										
2020										
2021										
2022										
2023										
2024										
2025										
2026										

FIGURES



Comments:

END





## 2012 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2012 - 5/31/2013

HERD: MD755 - NORTH CONVERSE

HUNT AREAS: 22

PREPARED BY: ERIKA  
PECKHAM

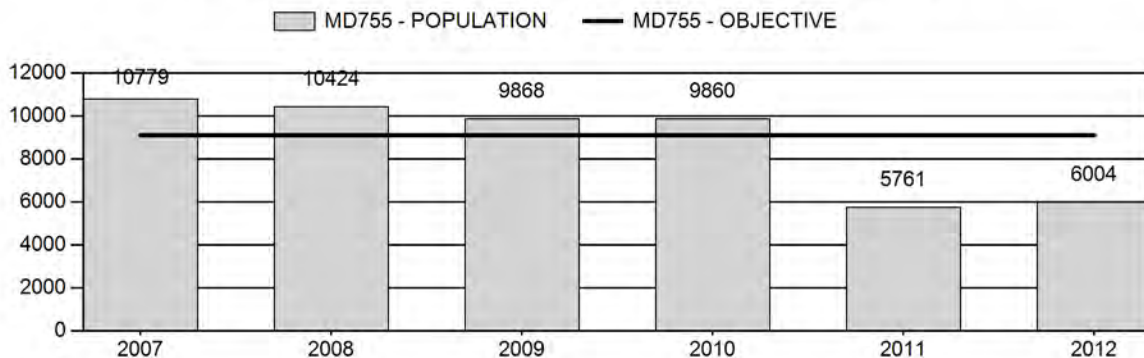
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	9,338	6,004	6,020
Harvest:	766	451	430
Hunters:	888	550	550
Hunter Success:	86%	82%	78%
Active Licenses:	952	577	580
Active License Percent:	80%	78%	74%
Recreation Days:	3,422	2,050	2,050
Days Per Animal:	4.5	4.5	4.8
Males per 100 Females	48	34	
Juveniles per 100 Females	70	75	

Population Objective: 9,100  
 Management Strategy: Special  
 Percent population is above (+) or below (-) objective: -34.0%  
 Number of years population has been + or - objective in recent trend: 1  
 Model Date: 03/07/2013

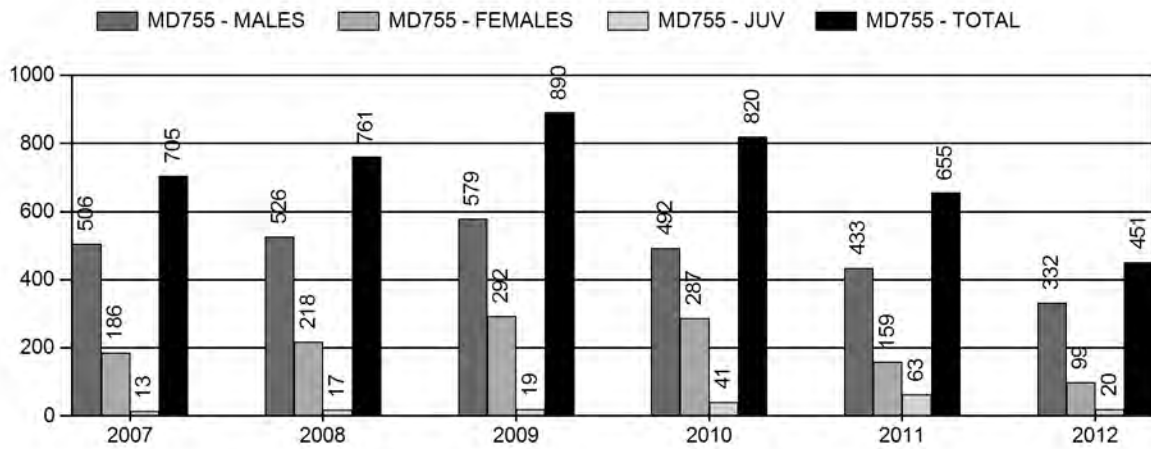
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq$ 1 year old:	2%	3.3%
Males $\geq$ 1 year old:	18.7%	23.3%
Juveniles (< 1 year old):	.2%	0%
Total:	5.54%	6.6%
Proposed change in post-season population:	-6.9%	.3%

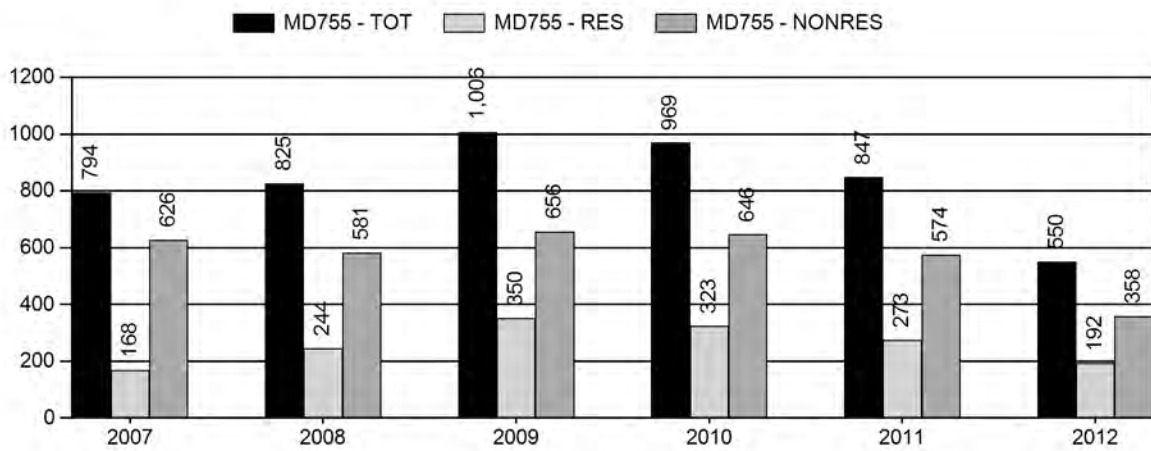
## Population Size - Postseason



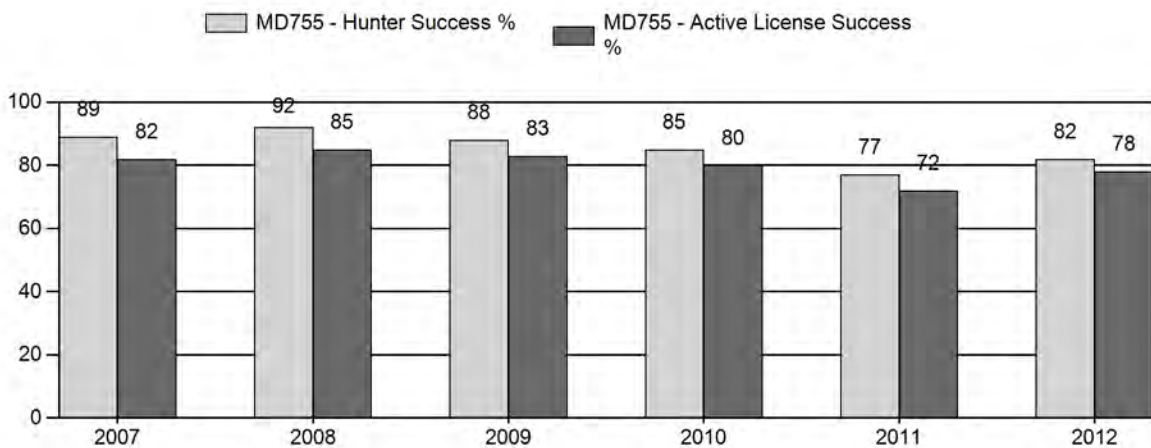
## Harvest



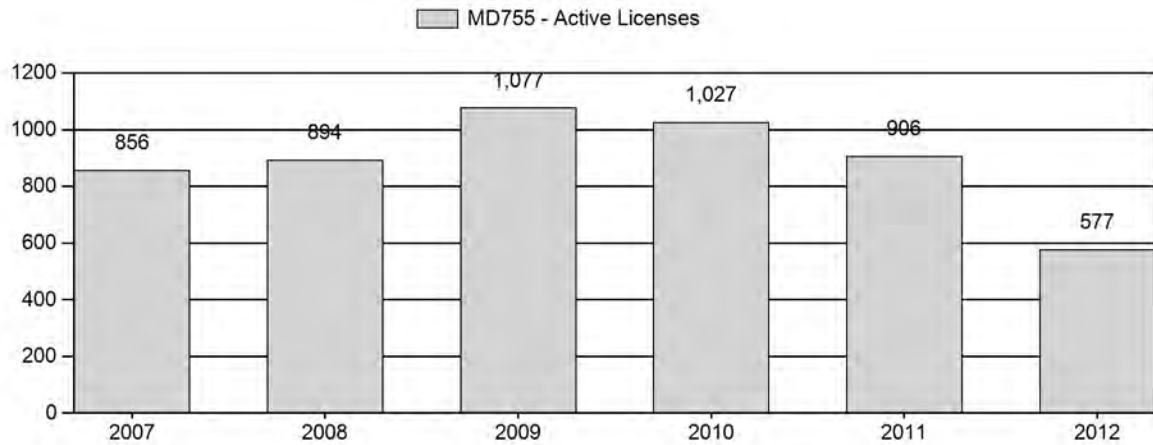
## Number of Hunters



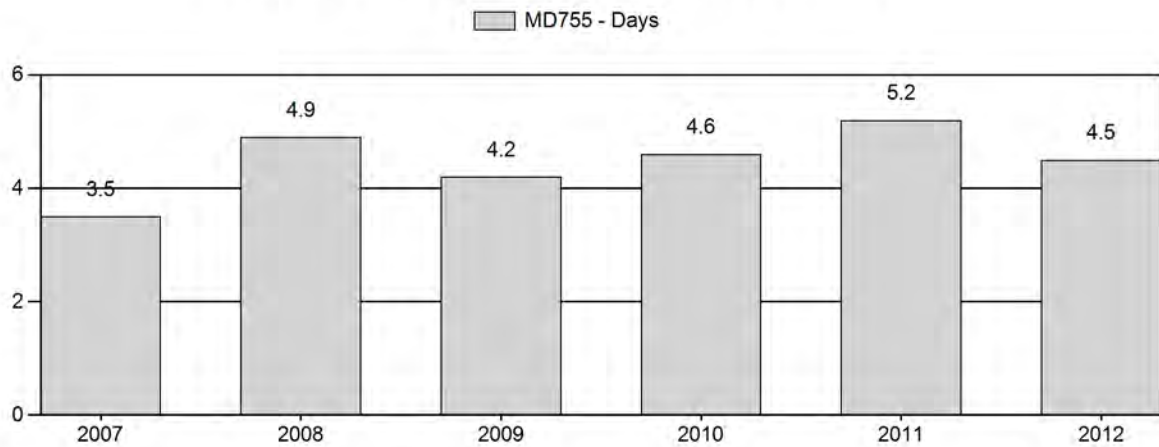
## Harvest Success



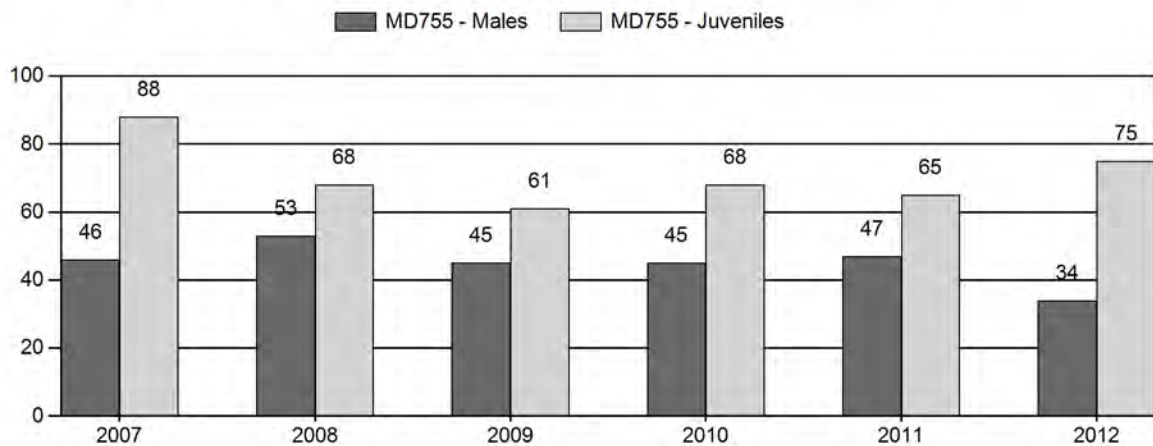
## Active Licenses



## Days per Animal Harvested



## Postseason Animals per 100 Females



## 2007 - 2012 Postseason Classification Summary

for Mule Deer Herd MD755 - NORTH CONVERSE

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	10,779	71	111	182	20%	392	43%	345	38%	919	1,200	18	28	46	± 5	88	± 8	60
2008	10,424	98	178	276	24%	524	45%	356	31%	1,156	1,975	19	34	53	± 5	68	± 6	44
2009	9,868	49	126	175	22%	393	49%	239	30%	807	1,351	12	32	45	± 5	61	± 6	42
2010	9,860	39	119	158	21%	349	47%	237	32%	744	850	11	34	45	± 5	68	± 7	47
2011	5,761	26	94	120	22%	257	47%	166	31%	543	1,276	10	37	47	± 6	65	± 8	44
2012	6,004	23	44	67	16%	198	48%	149	36%	414	0	12	22	34	± 6	75	± 10	56

**2013 HUNTING SEASONS  
NORTH CONVERSE MULE DEER HERD (MD755)**

<b>Hunt Area</b>	<b>Type</b>	<b>Dates of Seasons</b>		<b>Quota</b>	<b>Limitations</b>
		<b>Opens</b>	<b>Closes</b>		
22	1	Oct. 1	Oct. 14	600	Limited quota licenses; antlered mule deer or any white-tailed deer
	6	Oct. 1	Oct. 14	100	Limited quota licenses; doe or fawn
Archery		Sep. 1	Sep. 30		Refer to license type and limitations in Section 3

<b>Hunt Area</b>	<b>Type</b>	<b>Quota change from 2012</b>
22	6	-100

**Management Evaluation**

**Current Postseason Population Management Objective: 9,100**

**Management Strategy: Special**

**2012 Postseason Population Estimate: ~6,000**

**2013 Proposed Postseason Population Estimate: ~6,000**

**Herd Unit Issues**

The North Converse Mule Deer herd has a postseason population objective of 9,100 mule deer and is managed under the special management strategy, with a goal of maintaining postseason buck ratios between 30-45 bucks per 100 does. The objective and management strategy were last revised in 1997.

Public hunting access within the herd unit is poor, with only small tracts of accessible public land interspersed with predominantly private lands. High trespass fees and outfitting for mule deer are common on most ranches within this herd unit. As a result, licenses remain undersubscribed in years when issuance is elevated to increase harvest on an over-objective population. Primary land uses in this area include extensive oil and gas production, large-scale industrial wind generation, In-situ uranium production, and traditional cattle and sheep grazing. In recent years, expansion of oil shale development has dramatically escalated anthropogenic disturbance throughout this herd unit.

## **Weather**

Weather conditions throughout 2012 and into 2013 were extremely dry and warmer than normal. The winters of 2011-2012 and 2012-13 were mild and with little snow accumulation. As a result, over winter survival was likely high in bio-year 2011 and is presumed to again be good in bio-year 2012. Although the spring and summer of 2012 were extraordinarily dry, fawn productivity and over-summer survival was not impacted. However, both adults and fawns likely entered the 2012-2013 winter in extremely poor body condition.

## **Habitat**

Although there are no habitat transects in this herd unit, current habitat conditions are generally poor due to the extreme drought realized in 2012. Anecdotal observations by personnel confirm this, as there was little to no herbaceous and sagebrush forage production. In addition to poor leader growth production in 2012, sagebrush communities are likely experiencing heavy browsing pressure given remaining pronghorn densities in conjunction with large-scale domestic sheep production.

## **Field Data**

Fawn ratios have remained fairly consistent, with the 2012 ratio of 75 being higher than the preceding 5-year average of around 70. Postseason buck ratios declined to 34 in 2012, which was a marked decrease compared to the preceding 5 year average of 47. Regardless, the 2012 buck ratios remained within designated management strategy criteria.

It has been increasingly difficult to meet classification sample sizes in this herd unit as it is not a budget priority for aerial surveys. Total number of animals classified has steadily decreased since 2009. In 2012, the adequate sample size was 1,262 animals, yet only 414 mule deer were classified despite intensive ground coverage. This further corroborates the notion that this population has declined, as classification sample sizes have declined dramatically in recent years despite similar levels of effort.

## **Harvest**

License success in this herd unit continues to remain very high, averaging 80% over the preceding 5 years. Success again remained high in 2012 (78%). In 2012, only 371 of 600 licenses were issued through the draw with the remaining 229 licenses being issued after the draw. The number of Type 1 licenses being leftover after the draw has been significantly higher in previous years when license issuance was higher. In 2012, 64% of hunters reported being either satisfied or very satisfied with their hunt. This level of satisfaction is remarkably high given the lack of public access in this herd unit coupled with the fact that many hunters purchase leftover Type 1 licenses without securing private land permission. Given the recent population decline, Type 1 license issuance was reduced from 1,000 in 2010 to 600 in 2012. Based on the continued high license success and observed postseason buck ratios within management criteria, Type 1 license issuance was appropriate in 2012 to meet both hunter and landowner expectations. Given the model predicts a stable population through 2013, buck harvest should remain static.

## **Population**

The 2012 postseason population estimate was about 6,000 mule deer, which is an almost 20% reduction in this herd from the preceding 5-year average of ~9,300. This herd consistently remained above objective for several years (due to unsold licenses and a lack of public access) until substantial winter mortality occurred in bio-year 2010. This herd has since declined and is now 34% below objective.

The “Semi Constant Juvenile – Semi Constant Adult Mortality Rate” (SCJ-SCA) spreadsheet model was chosen for the post-season population estimate of this herd. This model essentially had the lowest relative AIC (46) and most accurately depicted population trend based on field personnel perceptions and extensive landowner input. Survival rates were adjusted downward in bio-year 2010 as significant winter mortality was known to occur. This model is considered to be of medium quality based on model fit, although managers strongly concur with simulated population trend. Regardless, given consistently inadequate classification sample sizes, observed buck ratios may not be accurate and therefore should not be used as a primary basis for assessing model quality.

## **Management Summary**

The hunting season in this area has traditionally run from October 1<sup>st</sup> to October 14<sup>th</sup>. These season dates have generally been adequate to meet landowner desires while allowing a reasonable harvest. For 2013, the Department retained Type 1 license issuance but instituted a limitation, restricting harvest to only antlered mule deer or any white-tailed deer. In addition, the Type 6 quota was reduced by 100 licenses to further reduce female harvest given the population is estimated to be 34% below objective. Some Type 6 licenses were retained to provide opportunity in some areas where localized high densities warrant female harvest.

If we attain the projected harvest of 430 individuals and experience normal fawn productivity, the predicted 2013 postseason population will likely remain stable at approximately 6,000 mule deer.

<b>INPUT</b>	
Species:	Mule Deer
Biologist:	Erika Peckham
Herd Unit & No.:	North Converse (MD755)
Model date:	02/22/13

☒ Clear form

MODELS SUMMARY				Check best model to create report	Notes
	Fit	Relative AICc			
CJ,CA	Constant Juvenile & Adult Survival	36	45	<input type="checkbox"/> CJ,CA Model	
SC,J,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	31	46	<input checked="" type="checkbox"/> SC,J,SCA Model	
TS,J,CA	Time-Specific Juvenile & Constant Adult Survival	4	111	<input type="checkbox"/> TS,J,CA Model	

Population Estimates from Top Model									
Year	Posthunt Population Est. Field Est	Trend Count	Predicted Prehunt Population		Predicted Posthunt Population		Total	Objective	
			Juveniles	Total	Juveniles	Total			
1993			2420	9592	2409	8733	9100		
1994			3093	9851	3063	8887	9100		
1995			3316	9963	3291	9151	9100		
1996			3941	10733	3931	10020	9100		
1997			3408	10722	3349	9828	9100		
1998			4386	11751	4331	10847	9100		
1999			4150	12039	4129	11069	9100		
2000			3293	11453	3265	10466	9100		
2001			2973	10929	2957	10071	9100		
2002			2601	10326	2581	9514	9100		
2003			2969	10347	2948	9594	9100		
2004			3233	10544	3224	9741	9100		
2005			3778	11113	3762	10289	9100		
2006			3033	10647	3026	9745	9100		
2007			4141	11555	4126	10779	9100		
2008			3354	11261	3336	10424	9100		
2009			2954	10847	2933	9868	9100		
2010			3205	10762	3160	9860	9100		
2011			1867	6481	1798	5761	9100		
2012			2119	6498	2097	6004	9100		
2013			2013	6493	1991	6020	9100		
2014							9100		
2015							9100		
2016							9100		
2017							9100		
2018							9100		
2019							9100		
2020							9100		
2021							9100		
2022							9100		
2023							9100		
2024							9100		
2025							9100		



Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est SE	Model Est	Field Est SE
1993	0.50		0.88	
1994	0.50		0.88	
1995	0.50		0.88	
1996	0.50		0.88	
1997	0.50		0.88	
1998	0.50		0.88	
1999	0.50		0.88	
2000	0.50		0.88	
2001	0.50		0.88	
2002	0.50		0.88	
2003	0.50		0.88	
2004	0.50		0.88	
2005	0.50		0.88	
2006	0.50		0.88	
2007	0.50		0.88	
2008	0.50		0.88	
2009	0.50		0.88	
2010	0.40		0.50	
2011	0.50		0.88	
2012	0.50		0.88	
2013	0.50		0.88	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

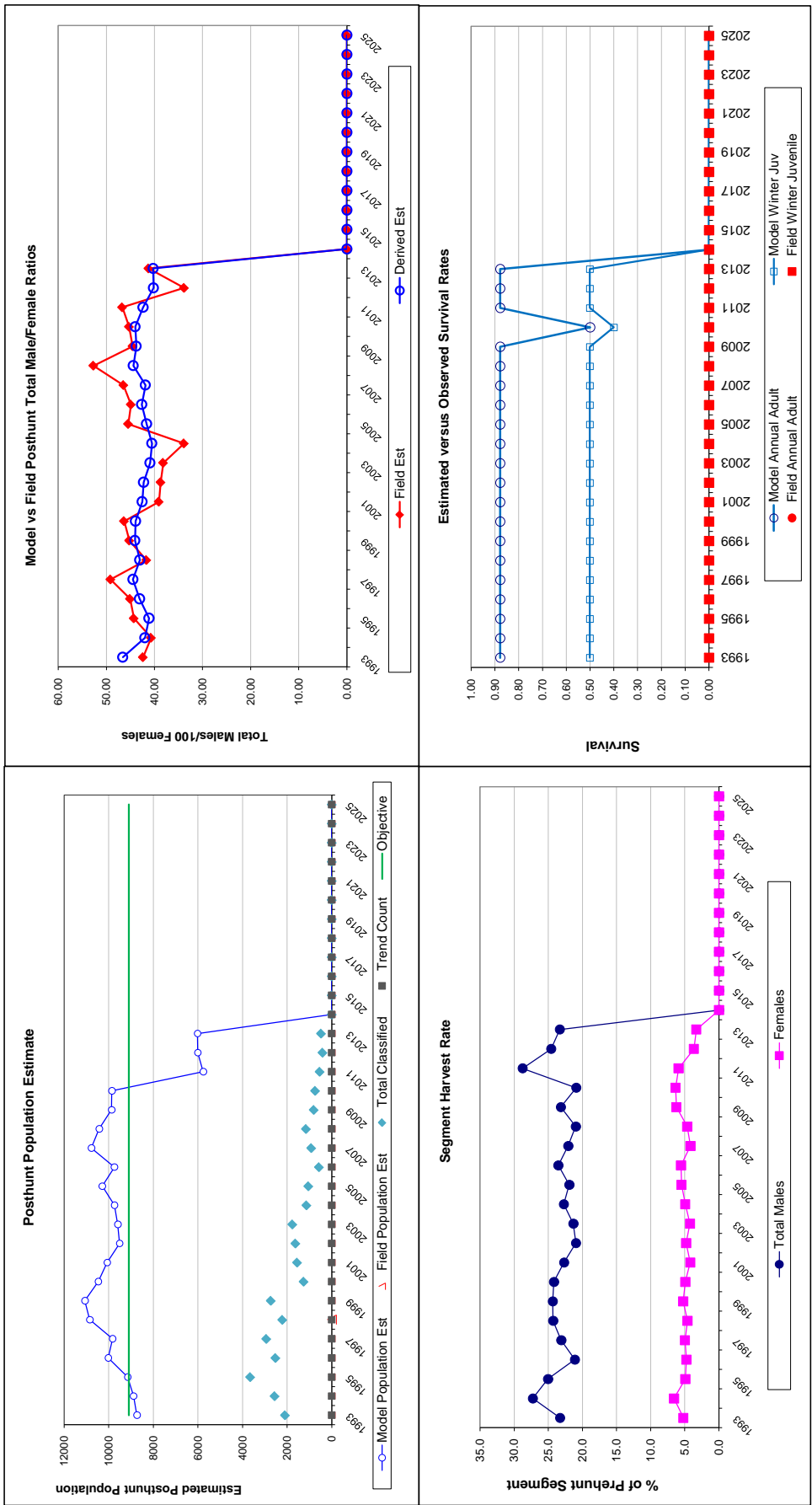
**Parameters:**  
Juvenile Survival =  
Adult Survival =  
Initial Total Male Pop/10,000 =  
Initial Female Pop/10,000 =

**MODEL ASSUMPTIONS**  
Sex Ratio (% Males) =  
Wounding Loss (total males) =  
Wounding Loss (females) =  
Wounding Loss (juveniles) =

Optim cells  
0.501  
0.878  
0.201  
0.432  
50%  
10%  
10%  
10%

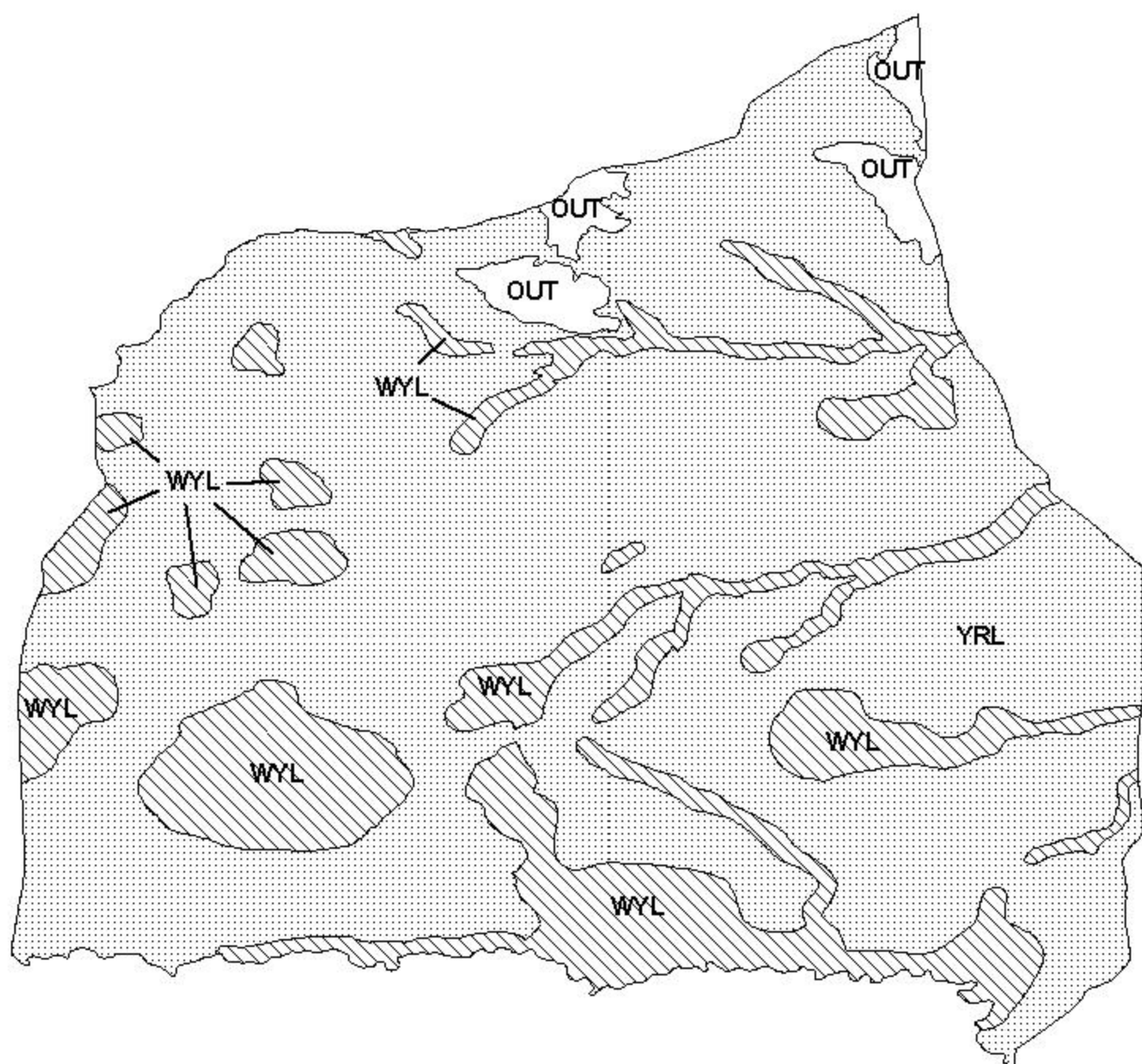
Year	Classification Counts					Harvest				
	Juvenile/Female Ratio		Total Male/Female Ratio			Juv		Segment Harvest Rate (% of		Total Harvest
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Males	Females	
1993		55.82	2.87	46.57	42.38	2.39	10	555	216	761
1994		74.68	3.31	41.97	40.71	2.19	27	587	263	877
1995		79.27	2.95	41.13	44.28	1.98	23	519	196	738
1996		92.38	4.09	43.07	45.06	2.48	9	446	194	649
1997		74.68	3.15	44.47	49.12	2.36	54	545	214	813
1998		95.09	4.45	43.03	41.67	2.51	50	572	200	822
1999		85.71	3.67	44.06	45.22	2.36	19	621	242	882
2000		65.27	4.25	43.91	46.31	3.37	25	637	236	898
2001		59.26	3.47	42.54	39.08	2.63	14	567	199	780
2002		52.94	3.09	42.23	38.71	2.51	18	496	224	738
2003		62.50	3.40	40.92	38.18	2.45	19	476	190	685
2004		69.53	4.60	40.52	33.87	2.85	8	503	219	730
2005		81.60	5.66	41.61	45.45	3.78	15	490	244	749
2006		64.23	6.20	42.62	44.89	4.87	6	562	252	820
2007		88.01	6.50	41.88	46.43	4.16	13	506	186	705
2008		67.94	4.67	44.39	52.67	3.92	17	526	218	761
2009		60.81	4.99	43.77	44.53	4.05	19	579	292	890
2010		67.91	5.72	43.99	45.27	4.34	41	492	287	820
2011		64.59	6.43	42.36	46.69	5.16	63	433	159	655
2012		75.25	8.16	40.20	33.84	4.78	20	332	97	449
2013		69.30	7.17	40.27	41.23	5.05	20	320	90	430
2014										
2015										
2016										
2017										
2018										
2019										
2020										
2021										
2022										
2023										
2024										
2025										

FIGURES



Comments:

END



Mule Deer (MD755) - North Converse  
HA 22  
Revised - 98



## 2012 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2012 - 5/31/2013

HERD: MD756 - SOUTH CONVERSE

HUNT AREAS: 65

PREPARED BY: HEATHER  
O'BRIEN

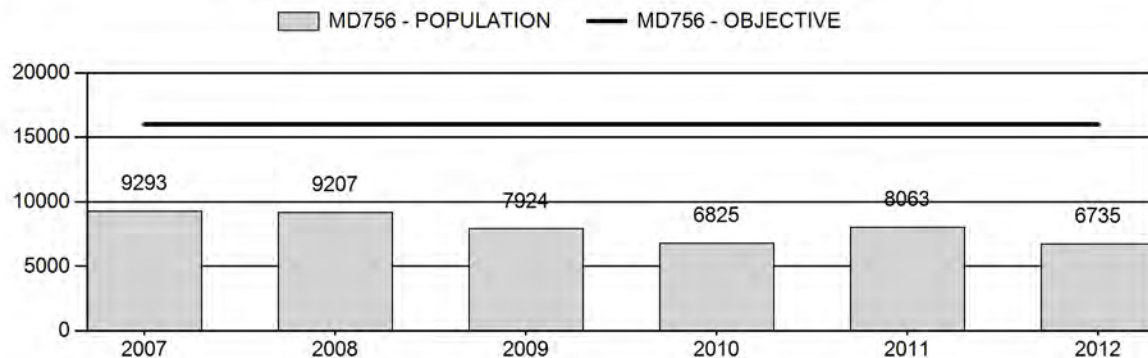
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	8,262	6,735	6,602
Harvest:	506	357	315
Hunters:	1,086	861	850
Hunter Success:	47%	41%	37%
Active Licenses:	1,116	861	850
Active License Percent:	45%	41%	37%
Recreation Days:	4,353	2,931	3,100
Days Per Animal:	8.6	8.2	9.8
Males per 100 Females	39	36	
Juveniles per 100 Females	52	46	

Population Objective: 16,000  
 Management Strategy: Recreational  
 Percent population is above (+) or below (-) objective: -57.9%  
 Number of years population has been + or - objective in recent trend: 12  
 Model Date: 5/7/2013

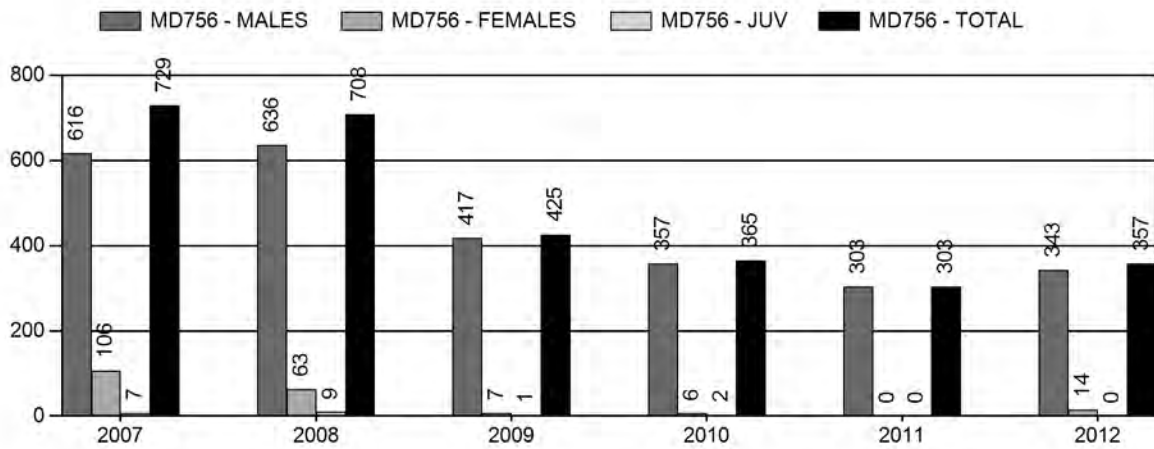
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq$ 1 year old:	0%	0%
Males $\geq$ 1 year old:	21.9%	20.5%
Juveniles (< 1 year old):	0%	0%
Total:	5.56%	4.53%
Proposed change in post-season population:	-5.5%	-4.9%

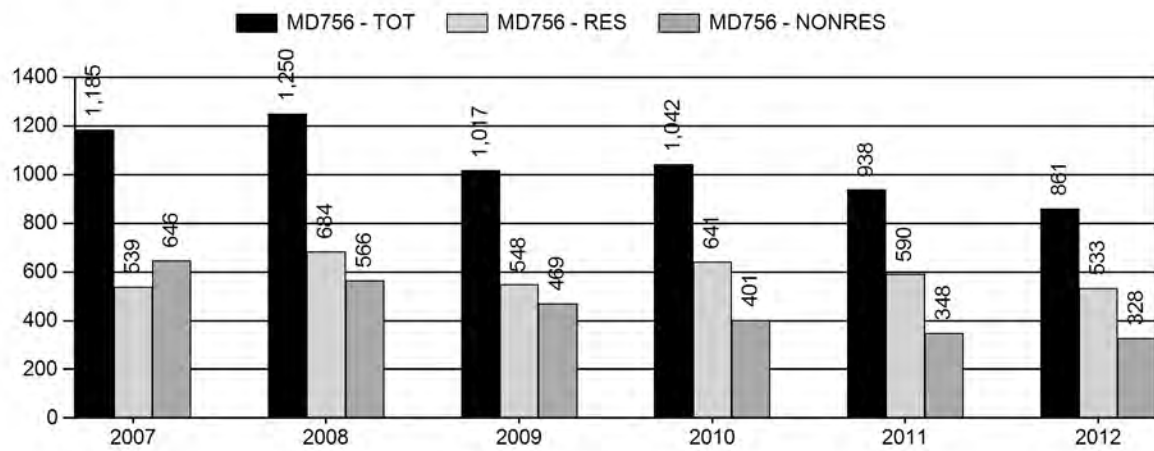
## Population Size - Postseason



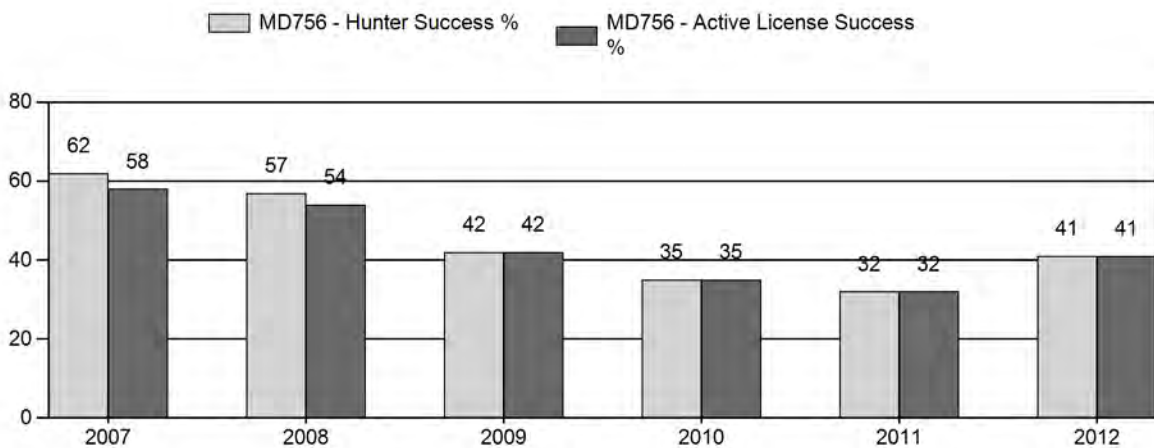
## Harvest



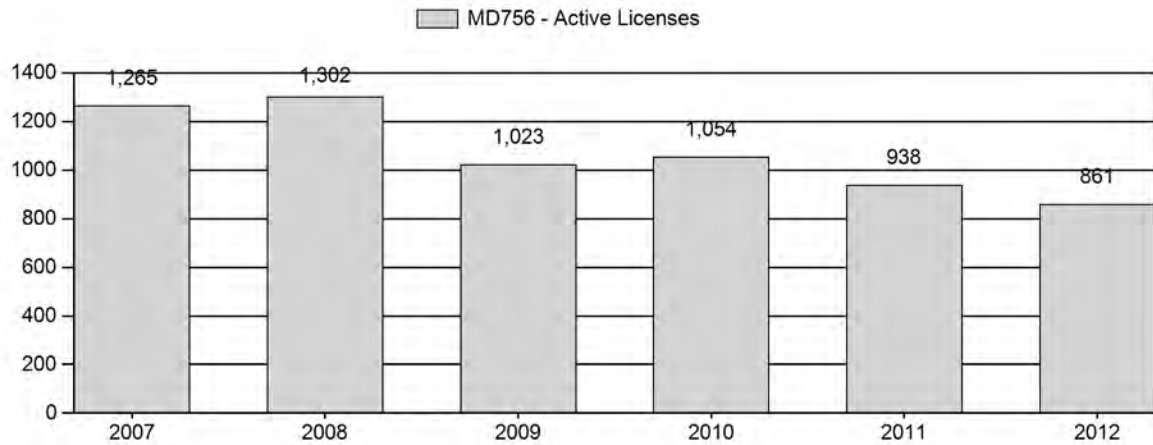
## Number of Hunters



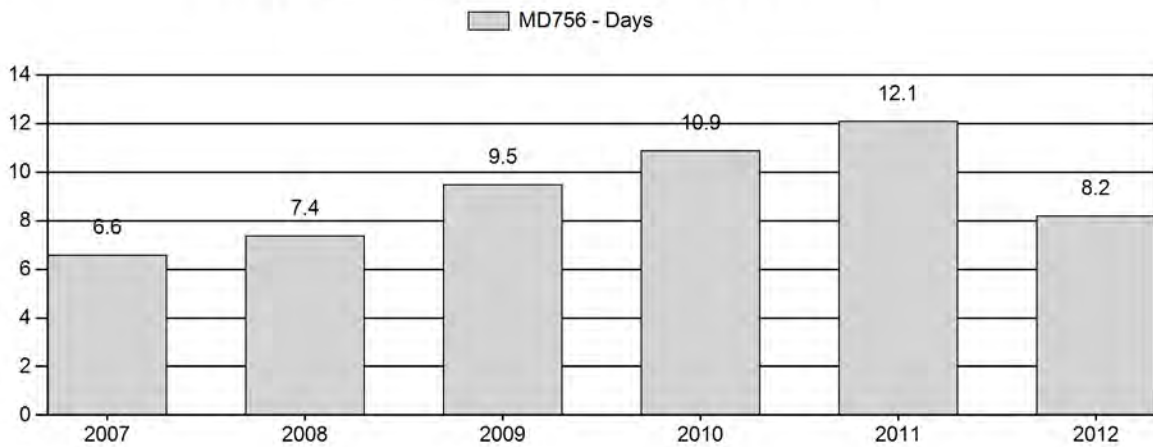
## Harvest Success



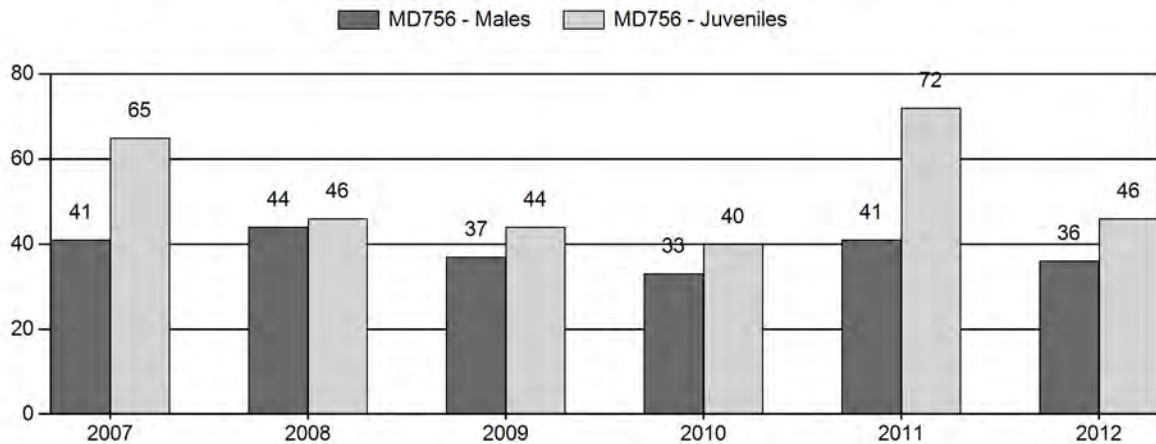
## Active Licenses



## Days per Animal Harvested



## Postseason Animals per 100 Females



**2007 - 2012 Postseason Classification Summary**

for Mule Deer Herd MD756 - SOUTH CONVERSE

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	9,307	42	111	153	20%	376	49%	243	31%	772	1,280	11	30	41	± 5	65	± 7	46
2008	9,218	63	183	246	23%	558	53%	256	24%	1,060	776	11	33	44	± 4	46	± 4	32
2009	9,868	57	149	206	20%	557	55%	243	24%	1,006	696	10	27	37	± 4	44	± 4	32
2010	6,837	84	154	238	19%	720	58%	287	23%	1,245	585	12	21	33	± 3	40	± 3	30
2011	8,080	83	167	250	19%	612	47%	441	34%	1,303	778	14	27	41	± 4	72	± 5	51
2012	6,771	89	163	252	20%	693	55%	318	25%	1,263	720	13	24	36	± 3	46	± 4	34



**2013 HUNTING SEASONS**  
**SOUTH CONVERSE MULE DEER (MD756)**

<b>Hunt Area</b>	<b>Type</b>	<b>Date of Seasons</b>		<b>Quota</b>	<b>Limitations</b>
		<b>Opens</b>	<b>Closes</b>		
65		Oct. 15	Oct. 21		General license; antlered mule deer or any white-tailed deer
Archery		Sept. 1	Sept. 30		Refer to license types and limitations in Section 3

**Region J Nonresident Quota:** 1,100

**Management Evaluation**

**Current Postseason Population Management Objective:** 16,000

**Management Strategy:** Recreational

**2012 Postseason Population Estimate:** 6,700

**2013 Proposed Postseason Population Estimate:** 6,600

The South Converse Mule Deer Herd Unit has a postseason population management objective of 16,000 deer. The herd is managed using the recreational management strategy, with a goal of maintaining postseason buck ratios between 20-29 bucks per 100 does. The objective and management strategy were last revised in 1989, and will be formally reviewed in 2013.

**Herd Unit Issues**

Hunting access within the herd unit is marginal, with tracts of public land and national forest interspersed with predominantly private lands. Walk-in and hunter management areas have provided additional hunting opportunity in several places within the herd unit. The main land use is traditional ranching and grazing of livestock, with agricultural fields that have the potential for damage issues when big game are abundant. Doe/fawn licenses have historically been issued to address damage, but are not currently necessary for mule deer. Disease issues are a concern within this herd unit in particular, as the prevalence of Chronic Wasting Disease (CWD) is higher here than any other area in Wyoming or adjacent states. Research investigating population-level effects of CWD is currently in its fourth and final year within the herd unit. Please refer to Appendix A of this report for further information regarding CWD and ongoing research in the South Converse Herd Unit.

## **Weather**

The winter of 2011-2012 was mild with below average snow accumulations and relatively warm temperatures. The growing season of 2012 through early winter of 2013 was extremely dry with above average temperatures. During the same time period, forage growth, forage quality, and available water were below average. As a result, very poor fawn ratios of 49:100 were observed during 2012 postseason classification surveys. The continued lack of quality forage in the winter of 2012-2013 could result in increased mule deer mortality in the spring of 2013, particularly if current late snow accumulations create an additional stressor.

## **Habitat**

This herd unit has several established habitat transects that measure production and utilization on True Mountain Mahogany (*Cercocarpus montanus*); however no data were collected in 2012. Comparable transects measured in 2012 in the adjacent Bates Hole Mule Deer Herd Unit showed the worst production since 2004 on Mountain Mahogany, and the worst production since 2002 on Big Sagebrush (*Artemisia tridentata*). It is thus presumed that poor shrub and herbaceous plant production were prevalent as a result of the 2012 summer drought. Lactating does and fawns in particular are likely to have suffered diminished nutrition during the last growing season. Winter utilization data were not collected in 2011-12.

## **Field Data**

Fawn ratios were moderate in this herd from 2000-2007, and the population fluctuated between approximately 8,000 and 12,000 deer during this time period. The general license season during this time period was 11 days, and issuance of doe/fawn licenses ranged from 50 to 400 licenses. A more liberal season was instituted in 2008, lengthening the season to 17 days and offering 200 doe/fawn licenses. From 2008-2012, fawn ratios were poor (40s per 100 does), with the exception of 2011 when the fawn ratio spiked to 72 fawns per 100 does. The population has gradually declined since 2008 from approximately 8,000 to 6,000 deer. In accordance, the general license season was shortened to 7 days. Doe/fawn licenses were diminished and subsequently eliminated from the 2011 and 2012 hunting seasons.

Buck ratios within the South Converse Herd historically average in the 30s-40s per 100 does, exceeding the upper limit for recreational management. These ratios seem counterintuitive, as current CWD research references higher prevalence in males than females (Farnsworth et al, 2005). Higher buck ratios in this unit are likely a function of limited access to hunting on private lands, where a minimal level of harvest pressure on bucks is typical.

## **Harvest Data**

Hunter success in this herd averaged between 50 and 60 percent from 1998-2008. Harvest success has been lower in recent years (32-42%) with declines in deer numbers, and was 40% in 2012. Hunter days per animal generally climbed from 1998 to 2011 from 5.1 to 12.1 days. Days per animal improved slightly in 2012, which is likely due in part to the previous year's higher fawn production. Harvest success and hunter days are not expected to improve in this herd unit until fawn production improves and enhances the growth rate of this population over consecutive years.

## **Population**

The 2012 postseason population estimate was approximately 6,800 and trending slightly downward from an estimated high of 15,800 deer in 1998. To date there have been no sightability surveys conducted in the herd unit, though one may be conducted in 2013-2014 if funding is secured. A sightability survey would provide an anchor point and improve the accuracy of the model.

The "Time-Specific Juvenile Survival – Constant Adult Survival" (TSJ,CA) spreadsheet model was chosen for the postseason population estimate of this herd. This model seemed the most representative of the herd, as it selects for higher juvenile survival during years when field personnel observed more favorable environmental and habitat conditions. The simpler models (CJ,CA and SCJ,CA) select for a very low juvenile survival rate, which does not seem feasible for this herd. All three models follow a trend that seems representative for the herd unit. However, the CJ,CA and SCJ,CA models estimate a larger population overall which do not seem realistic compared to historic and current perceptions of field personnel. While the TSJ,CA model has the highest AIC, it is still within one order of magnitude of the other model AICs. The model is considered to be of good quality. Survival rates are currently being collected in this herd as part of a graduate research project, and will be incorporated into the model when they become available.

## **Management Summary**

Opening day for hunting the South Converse Mule Deer Herd Unit has traditionally been October 15<sup>th</sup>, with closing dates that have changed to offer greater or lesser opportunity depending on the management direction desired. In recent years, general licenses have been valid for antlered mule deer only. Doe/fawn licenses are offered in years the herd is above management objective, or in cases where agricultural damage is an issue. The 2013 hunting season will consist of a short, seven-day season with no doe/fawn licenses, as the population is at

an almost historic low. Until habitat conditions and weather allow for higher fawn production, this population will likely remain low and seasons will remain conservative.

If we attain the projected harvest of 315 bucks and fawn ratios remain poor, this herd will likely remain stable but low. The predicted 2013 postseason population size of the South Converse Herd is approximately 6,600 mule deer.

### **Citations**

Farnsworth, M.L., L.L. Wolfe, N.T. Hobbs, K.P. Burnham, E.S. Williams, D.M. Theobald, M.M. Conner, & M.W. Miller. Human Land Use Influences Chronic Wasting Disease Prevalence in Mule Deer. *Ecological Applications*, 15(1): 119-126.

INPUT

Species:  
Biologist:  
Herd Unit & No.:  
Model date:

Deer  
Heather O'Brien  
South Converse  
06/30/12

MODELS SUMMARY					Check best model to create report		Notes
					Relative AICc	Fit	
CJ,CA	Constant Juvenile & Adult Survival			89	98		
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival			46	63	<input type="checkbox"/> CJ,CA Model <input type="checkbox"/> SCJ,SCA Mod	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival			8	127	<input type="checkbox"/> TSJ,CA Model	

☐ Clear form

Population Estimates from Top Model											
Year	Posthunt Population Est.		Trend Count		Predicted Prehunt Population			Predicted Posthunt Population			Objective
	Field Est	Field SE			Juveniles	Total Males	Females	Juveniles	Total Males	Females	Total
1993					3223	2474	7425	3192	1167	6793	11152
1994					3000	1575	6091	2993	914	5821	9728
1995					3663	1509	5447	3663	921	5447	10032
1996					5037	2388	6020	5037	1758	6020	12815
1997					5367	2596	6017	5367	1797	6017	13182
1998					7423	2516	5903	7423	1807	5903	15132
1999					5812	2934	6222	5797	1904	6053	13754
2000					4189	2839	6169	4172	1960	5903	12035
2001					2670	2850	5814	2647	1930	5583	10160
2002					2700	2079	5010	2659	1466	4756	8881
2003					2491	1708	4349	2456	1219	4068	7742
2004					2919	2083	4370	2914	1530	4342	8786
2005					2940	2293	4550	2938	1830	4508	9276
2006					2452	2314	4464	2450	1748	4422	8619
2007					2938	2505	4651	2931	1827	4535	9293
2008					2251	2781	4954	2241	2082	4885	9207
2009					1904	2119	4369	1903	1680	4361	7824
2010					1561	1749	3917	1559	1356	3910	6825
2011					2767	1790	3840	2767	1457	3840	8063
2012					1771	1722	3635	1771	1345	3620	6735
2013					1748	1688	3513	1748	1341	3513	6602
2014											16000
2015											16000
2016											16000
2017											16000
2018											16000
2019											16000
2020											16000
2021											16000
2022											16000
2023											16000
2024											16000
2025											16000

Survival and Initial Population Estimates

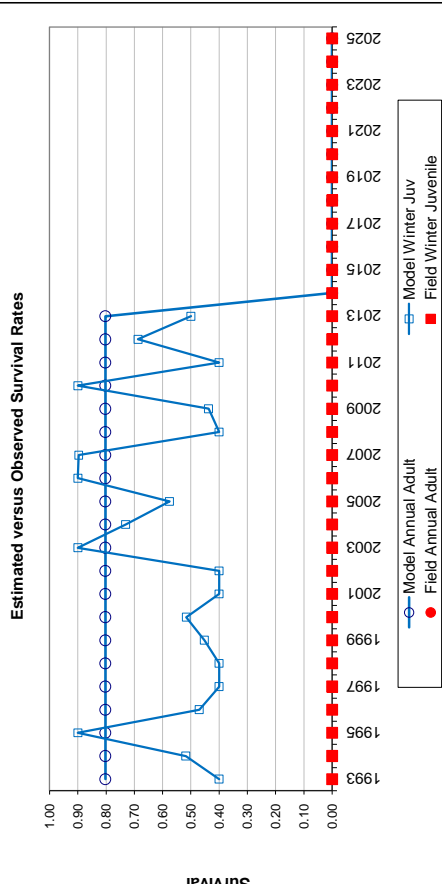
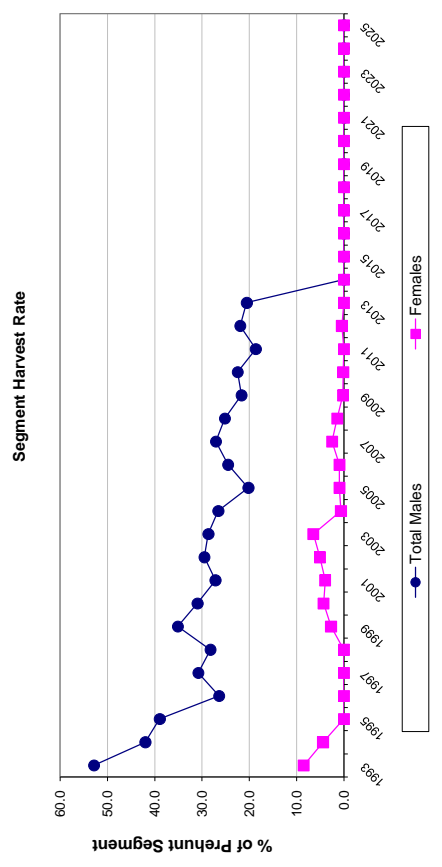
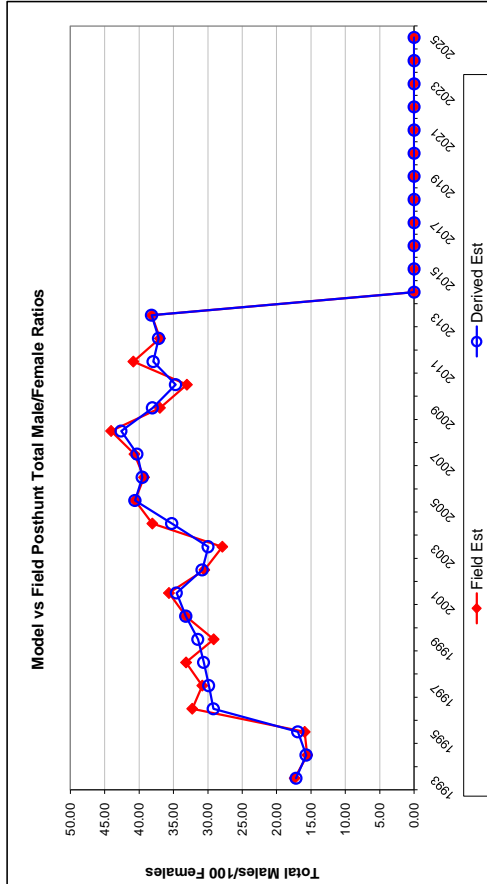
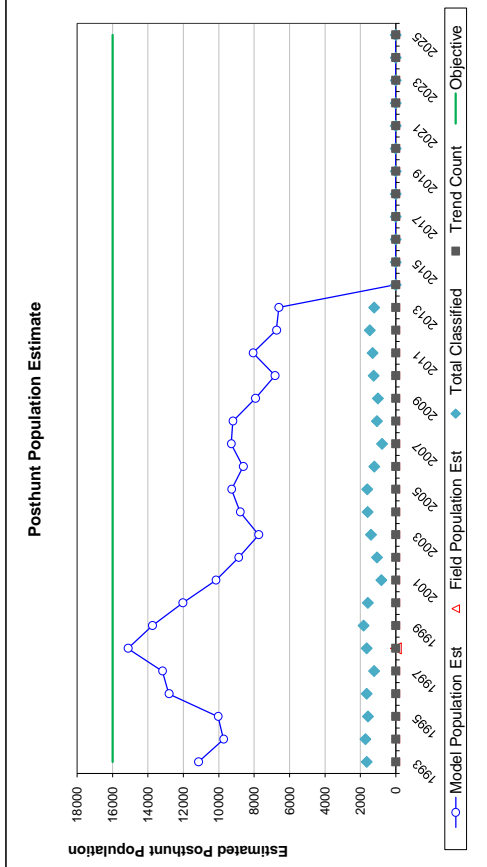
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.40		0.80	
1994	0.52		0.80	
1995	0.90		0.80	
1996	0.47		0.80	
1997	0.40		0.80	
1998	0.40		0.80	
1999	0.45		0.80	
2000	0.52		0.80	
2001	0.40		0.80	
2002	0.40		0.80	
2003	0.90		0.80	
2004	0.73		0.80	
2005	0.58		0.80	
2006	0.90		0.80	
2007	0.90		0.80	
2008	0.40		0.80	
2009	0.44		0.80	
2010	0.90		0.80	
2011	0.40		0.80	
2012	0.69		0.80	
2013	0.50		0.80	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:		Optim cells
Adult Survival =		0.803
Initial Total Male Pop/10,000 =		0.117
Initial Female Pop/10,000 =		0.679

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

Classification Counts										Harvest		
Year	Juvenile/Female Ratio			Total Male/Female Ratio			Juv	Males	Females	Total Harvest	Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE					Total Males	Females
1993		46.99	2.63	17.18	17.37	1.43	28	1188	574	1790	52.8	8.5
1994		51.42	2.76	15.70	15.54	1.32	6	601	245	852	42.0	4.4
1995		67.25	3.63	16.91	15.91	1.47	0	534	0	534	38.9	0.0
1996		83.66	4.50	29.20	32.28	2.37	0	573	0	573	26.4	0.0
1997		89.19	5.51	29.87	30.81	2.69	0	726	0	726	30.8	0.0
1998		125.75	6.70	30.60	33.18	2.64	0	645	0	645	28.2	0.0
1999		95.78	4.82	31.45	29.16	2.16	13	937	154	1104	35.1	2.7
2000		70.69	3.96	33.20	33.20	2.40	15	799	242	1056	31.0	4.3
2001		47.40	3.97	34.58	35.67	3.30	21	654	210	885	27.1	4.0
2002		55.91	3.92	30.82	30.51	2.65	37	557	231	825	29.5	5.1
2003		60.38	3.61	29.97	27.90	2.19	32	445	256	733	28.7	6.5
2004		67.10	3.81	35.24	38.08	2.61	5	503	25	533	26.6	0.6
2005		65.17	3.71	40.59	40.59	2.70	2	421	38	461	20.2	0.9
2006		55.39	3.72	39.52	39.29	2.97	2	515	38	555	24.5	0.9
2007		64.63	5.32	40.30	40.69	3.90	7	616	106	729	27.0	2.5
2008		45.88	3.46	42.61	44.09	3.37	9	636	63	708	25.2	1.4
2009		43.63	3.35	38.07	36.98	3.02	1	417	7	425	21.6	0.2
2010		39.86	2.78	34.69	33.06	2.47	2	357	6	365	22.5	0.2
2011		72.06	4.50	37.94	40.85	3.07	0	303	0	303	18.6	0.0
2012		48.92	3.04	37.16	36.98	2.54	0	343	14	357	21.9	0.4
2013		49.77	3.39	38.17	38.18	2.86	0	315	0	315	20.5	0.0
2014												
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												

FIGURES



Comments:

END



## **APPENDIX A**

### **Chronic Wasting Disease in the South Converse Mule Deer Herd Unit: Prevalence and Management Concerns**

The South Converse Mule Deer Herd Unit (Wyoming Hunt Area 65) has the highest prevalence of Chronic Wasting Disease (CWD) in Wyoming. High prevalence of CWD in mule deer is of particular concern to local wildlife managers, as mule deer herds statewide have declined due to a number of environmental factors. Managers are concerned that CWD may be an additive factor influencing mortality rates in the South Converse Herd, as it may be degrading the health of breeding-age females, suppressing conception rates, and affecting health and survivorship of neonates. Additionally, CWD may be adversely affecting deer survival due to behavioral changes - rendering infected deer more vulnerable to natural causes of mortality such as predation or exposure.

Hunter-harvested deer have been tested in this herd unit since 2001. It should be noted that hunter-harvested samples do not represent a random sample of this population. Rather, samples are biased towards younger age-class males, as hunting seasons have focused on antlered deer, and hunters who harvest larger mature bucks often decline sampling. Thus, prevalence in hunter-harvested deer may not be representative of the herd as a whole, but trends are likely to be similar.

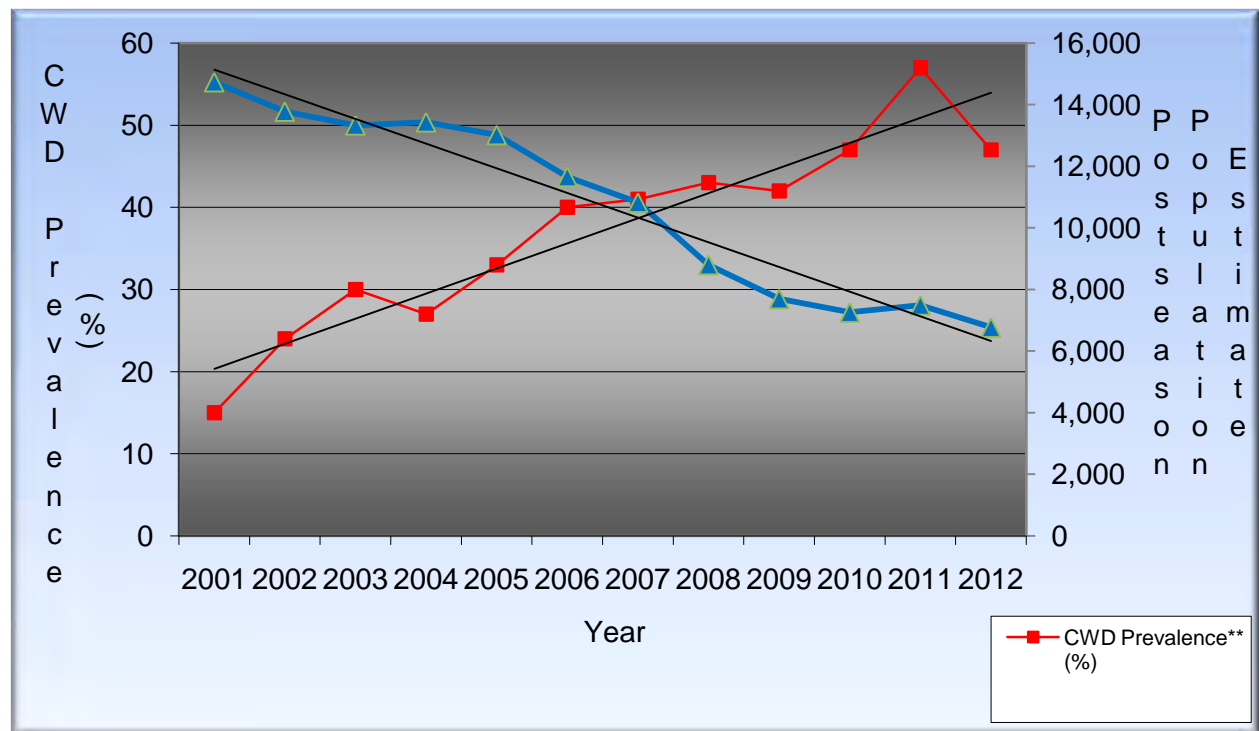
Since 2001, prevalence of CWD in hunter-harvested mule deer has increased significantly in the South Converse Mule Deer Herd, while the population has concurrently decreased (Table 1, Figure 1). Considering CWD is ultimately fatal in cervids, higher prevalence is suspected of having more adverse and perhaps additive impacts at the population level - either directly or indirectly. However, it is difficult to discern or quantify the impacts of CWD on this population without further study.

A collaborative research project was initiated in 2010 to investigate the effects of CWD on the South Converse Mule Deer Herd. Using GPS-collared deer, a number of variables have been explored to better understand the relationship between CWD and the dynamics of the population. This research is a cooperative effort of the United States Geological Survey, the University of Wyoming, and the Wyoming Game and Fish Department, and is in its fourth and final field season. Results should become available and published as analysis is completed.

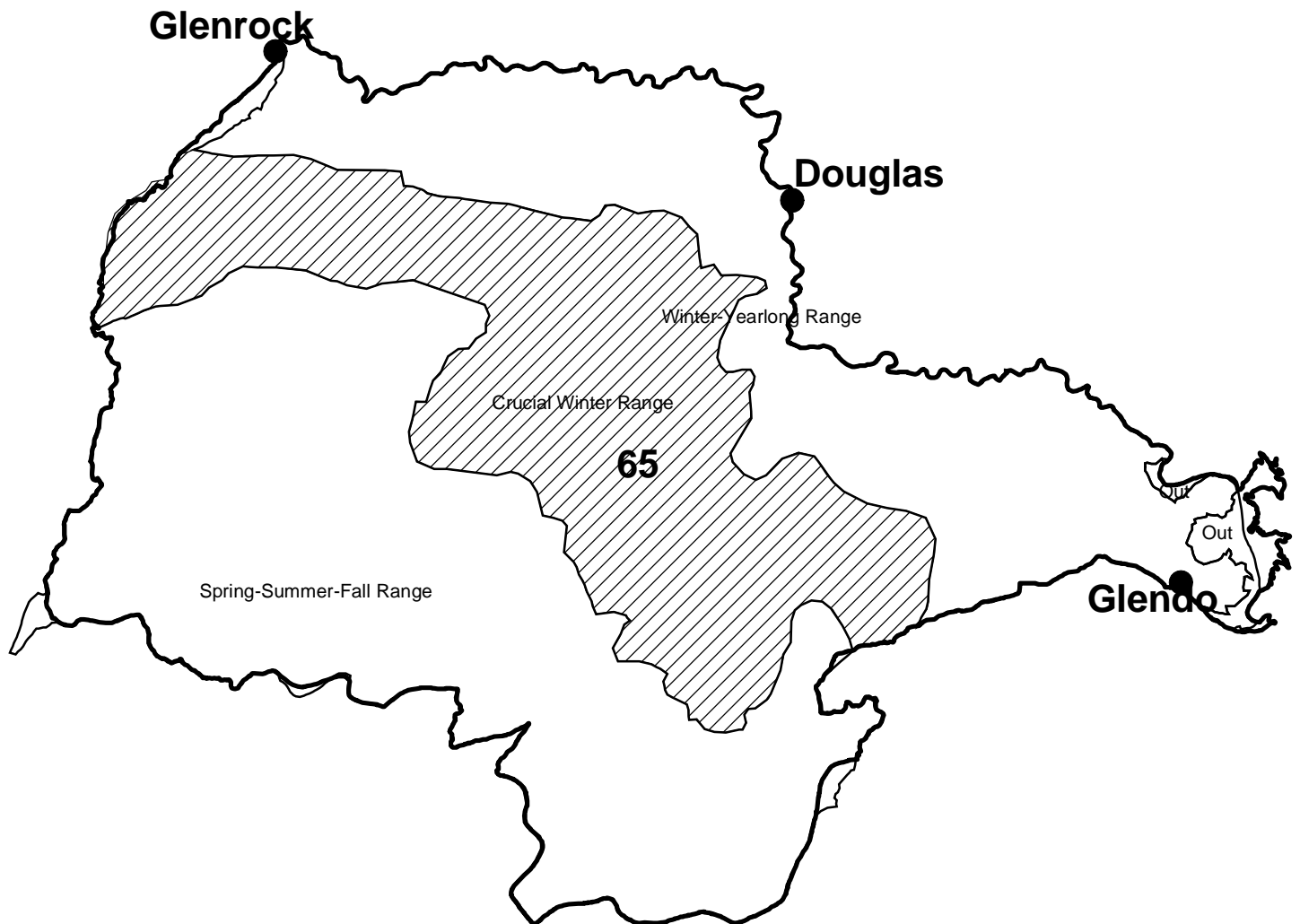
**Table 1.** CWD surveillance in hunter-harvested mule deer in the South Converse Herd Unit, 2001-2012.

Year	Total Harvest	N Tested	N Positive	CWD Prevalence
2001	885	81	12	<b>15%</b>
2002	825	98	23	<b>24%</b>
2003	733	155	46	<b>30%</b>
2004	533	52	14	<b>27%</b>
2005	461	88	29	<b>33%</b>
2006	555	81	32	<b>40%</b>
2007	729	74	30	<b>41%</b>
2008	708	44	19	<b>43%</b>
2009	425	48	20	<b>42%</b>
2010	365	42	20	<b>47%</b>
2011	303	35	20	<b>57%</b>
2012	345	30	14	<b>47%</b>

**Figure 1.** CWD prevalence of hunter-harvested mule deer and postseason population estimates for the South Converse Mule Deer Herd Unit, 2001-2012.



Mule Deer - South Converse  
Hunt Area 65  
Casper Region  
Revised 3/94





## 2012 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2012 - 5/31/2013

HERD: MD757 - BATES HOLE/HAT SIX

HUNT AREAS: 66-67

PREPARED BY: HEATHER  
O'BRIEN

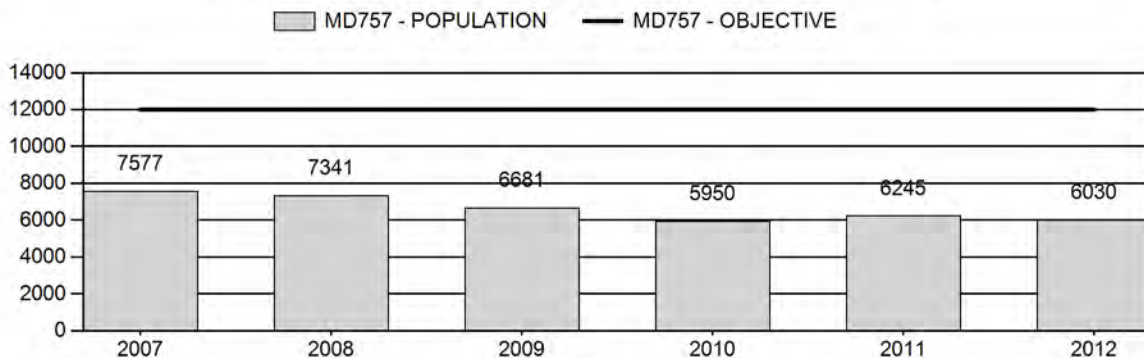
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	6,759	6,030	5,865
Harvest:	472	241	205
Hunters:	1,082	757	700
Hunter Success:	44%	32%	29%
Active Licenses:	1,097	757	700
Active License Percent:	43%	32%	29%
Recreation Days:	3,964	2,431	2,700
Days Per Animal:	8.4	10.1	13.2
Males per 100 Females	25	17	
Juveniles per 100 Females	57	61	

Population Objective:	12,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-49.8%
Number of years population has been + or - objective in recent trend:	19
Model Date:	5/7/2013

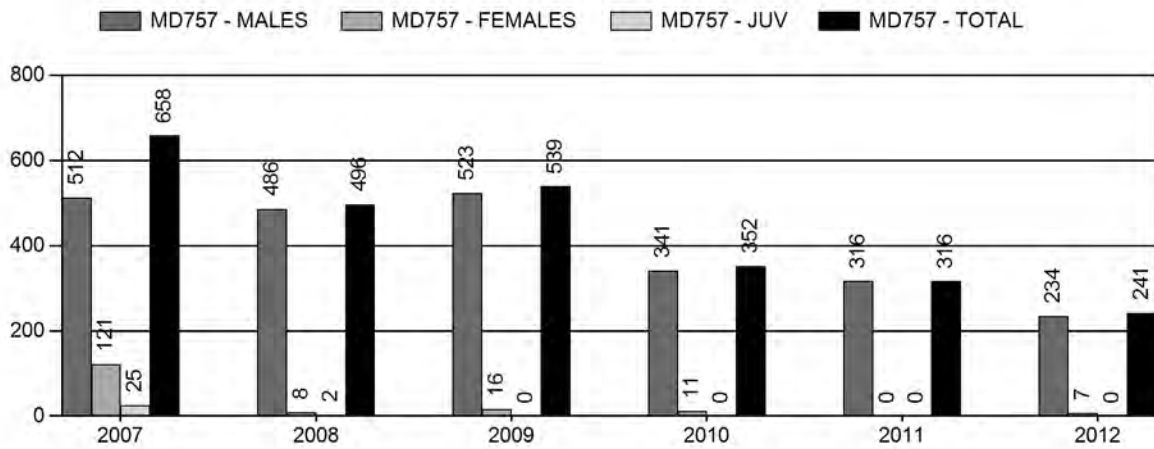
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq$ 1 year old:	0.2%	0.2%
Males $\geq$ 1 year old:	26.7%	22%
Juveniles (< 1 year old):	0%	0%
Total:	7.2%	6.4%
Proposed change in post-season population:	-3.4%	-2.7%

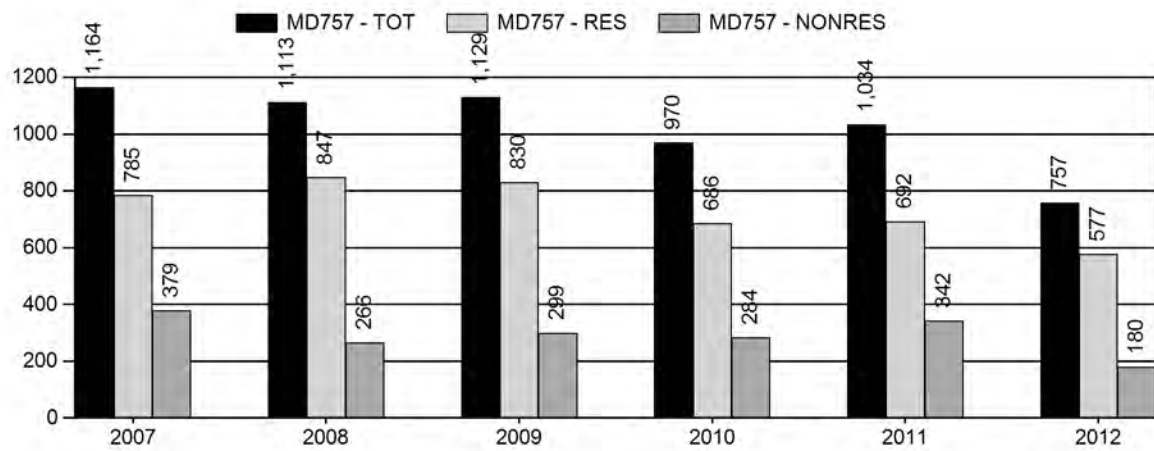
## Population Size - Postseason



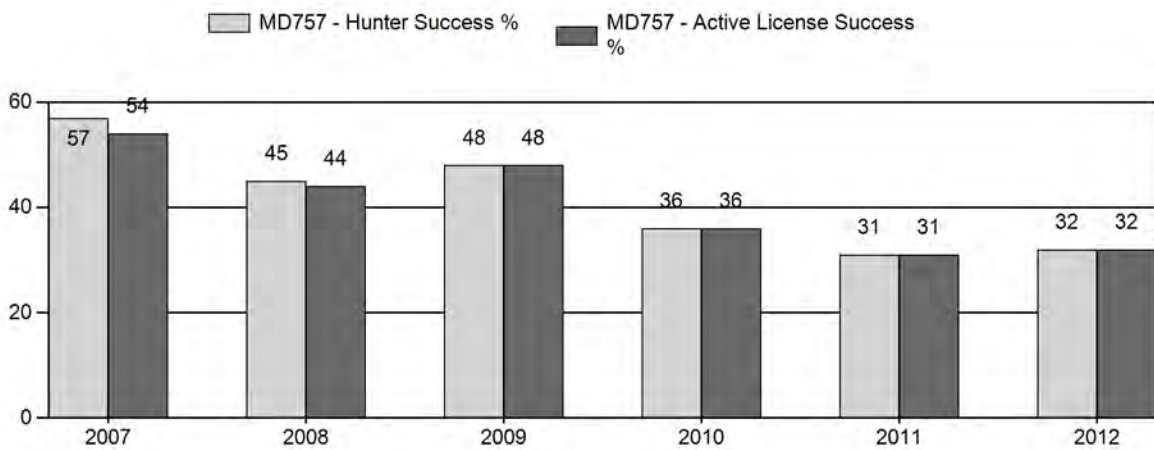
## Harvest



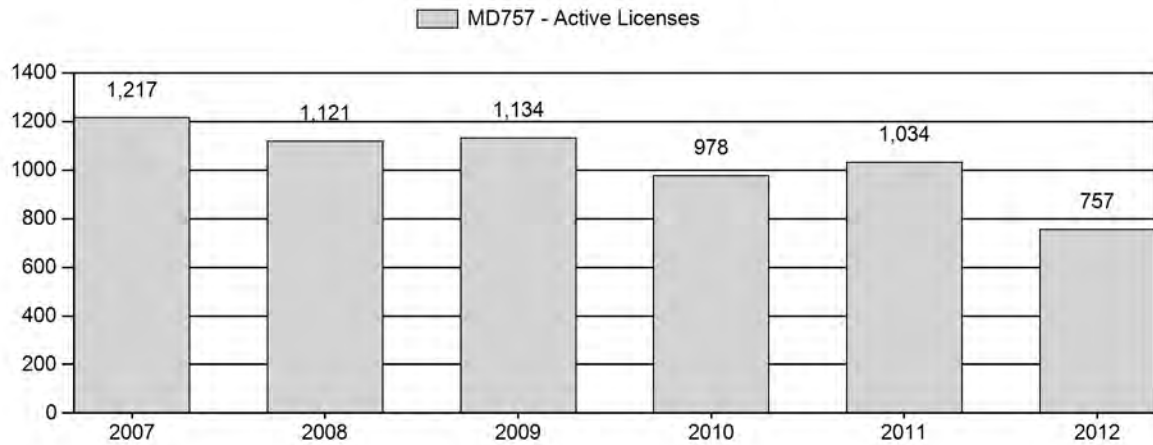
## Number of Hunters



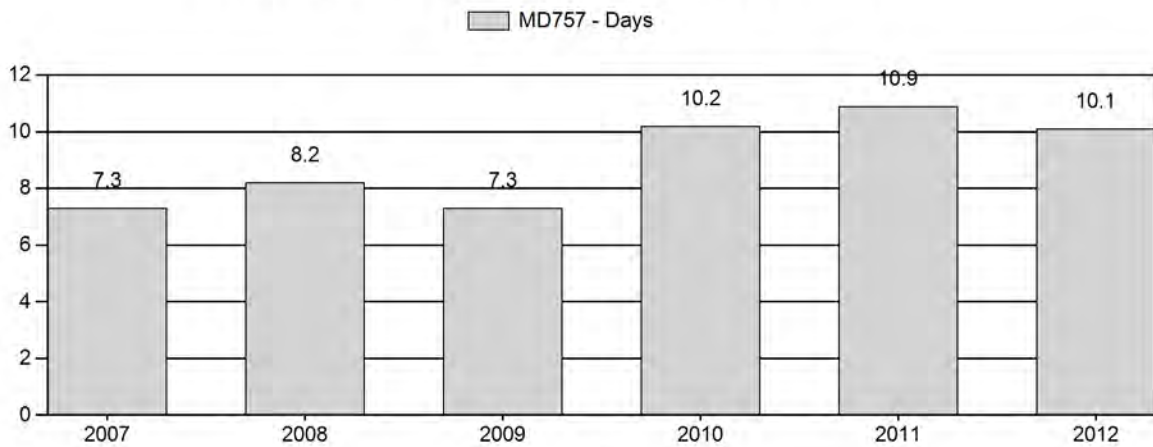
## Harvest Success



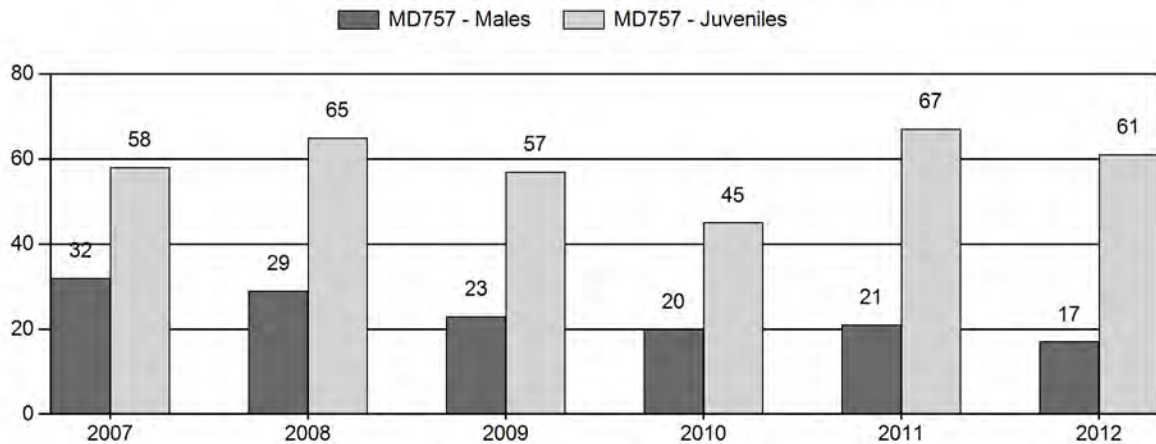
## Active Licenses



## Days per Animal Harvested



## Postseason Animals per 100 Females



**2007 - 2012 Postseason Classification Summary**

for Mule Deer Herd MD757 - BATES HOLE/HAT SIX

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	7,582	99	156	255	17%	804	53%	466	31%	1,525	1,005	12	19	32	± 3	58	± 4	44
2008	7,347	75	114	189	15%	647	52%	418	33%	1,254	1,166	12	18	29	± 3	65	± 5	50
2009	6,687	59	112	171	13%	730	55%	419	32%	1,320	934	8	15	23	± 2	57	± 4	47
2010	5,956	82	100	182	12%	894	60%	403	27%	1,479	642	9	11	20	± 2	45	± 3	37
2011	6,252	47	93	140	11%	666	53%	443	35%	1,249	698	7	14	21	± 2	67	± 5	55
2012	6,034	27	90	117	10%	689	56%	418	34%	1,224	650	4	13	17	± 2	61	± 4	52



**2013 HUNTING SEASONS  
BATES HOLE / HAT SIX MULE DEER (MD757)**

<b>Hunt Area</b>	<b>Type</b>	<b>Date of Seasons</b>		<b>Quota</b>	<b>Limitations</b>
		<b>Opens</b>	<b>Closes</b>		
66		Oct. 15	Oct. 21		General license; antlered mule deer three (3) points or more on either antler or any white-tailed deer
67					CLOSED
Archery		Sept. 1	Sept. 30		Refer to license type and limitations in Section 3.

**Region D Nonresident Quota:** 600

**Management Evaluation**

**Current Postseason Population Management Objective:** 12,000

**Management Strategy:** Recreational

**2012 Postseason Population Estimate:** 6,000

**2013 Proposed Postseason Population Estimate:** 6,000

The Bates Hole / Hat Six Mule Deer Herd Unit has a postseason management objective of 12,000 deer. The herd is managed using the recreational management strategy, with a goal of maintaining postseason buck ratios between 20-29 bucks per 100 does. The objective and management strategy were last revised in 1990, and will be formally reviewed in 2015.

**Herd Unit Issues**

Hunting access within the herd unit is very good, with large tracts of public lands as well as a sizeable hunter management area. The main land use within the herd unit is traditional ranching and grazing of livestock. Very little industrial or energy development exists in this herd unit. Area 67, which includes the northern portion of Casper Mountain, remains closed to hunting. Residents of small properties that dominate the hunt area are strongly opposed to hunting in their portion of the herd unit.

**Weather**

The winter of 2011-2012 was mild with below average snow accumulations and relatively warm temperatures. The growing season of 2012 and early winter of 2013 were extremely dry with above average temperatures. During the same time period, available water, forage growth, and

forage quality were below average in some parts of the herd unit. Areas at higher elevation south of Muddy Mountain appeared to receive more frequent precipitation during the summer of 2012. As a result, fawn productivity was better here and may have contributed to better fawn ratios compared to adjacent herd units. While the first part of the 2012-2013 was mild, snow events have become more frequent during the later part of winter. While this creates the potential for higher late-winter mortality, the moisture could prove valuable to spring growth of herbaceous plants and shrubs and charging of reservoirs and riparian areas.

## **Habitat**

This herd unit has several established transects that measure production (N=3) and utilization (N=8) on True Mountain Mahogany (*Cercocarpus montanus*). Average leader growth in 2012 on mahogany was 0.30 inches (7.6 mm) - the worst production since 2004. Utilization was light, with an average of 13.6% leaders browsed per shrub. Such poor herbaceous plant production was a result of the 2012 drought. Lactating does and their fawns in particular are likely to have suffered diminished nutrition during the last growing season. However, some portions of the herd unit appeared to be in better condition resulting from more frequent rain events – in particular those areas south of Muddy Mountain and at slightly higher elevation in Bates Hole. Better habitat conditions in this portion of the herd unit may have improved spring and summer fawn survival, and may account for the higher fawn ratio in this herd unit compared to adjacent units.

## **Field Data**

Fawn ratios were relatively good in this herd from 1998-2005. The population remained relatively stable, until increased issuance of doe/fawn licenses and longer seasons decreased the herd from approximately 9,300 to 7,000 deer. From 2006-present, fawn ratios were moderate to poor. The population began to decline, and with it doe/fawn licenses were reduced and then eliminated. Season length was decreased from 11 to 7 days, and the herd has remained stable near 6,000 animals from 2010-2012.

Buck ratios for the Bates Hole / Hat Six Herd historically average in the mid-20s, though they have occasionally exceeded recreational limits and risen into the low to mid 30's. In more recent years, the buck ratio has declined to the low 20s per 100 does, and in 2012 it reached a low of 17 per 100 does. Many landowners and hunters have complained of too much hunter pressure within the herd unit and a lack of mature bucks. Some have voiced a desire to change the herd unit from a general license area to limited quota as a means to improve buck ratios. In 2012, 48% of field-checked deer were yearling bucks, indicating that hunters either were not being selective for mature bucks, or had difficulty finding mature bucks and thus harvested yearlings. In either case, young bucks are being harvested before they reach maturity, and hunter satisfaction was

lower in this herd unit than any other in the Casper Biologist District (44%). Improved fawn production, improved fawn survival, and/or reduced harvest of yearling bucks will be necessary to improve mature buck ratios and presumably raise hunter satisfaction in future years.

## **Harvest Data**

Hunter success in this herd has fluctuated as a function of population size and season length. In recent years, harvest success was highest when the population was higher and the season was longer. Harvest success has decreased in recent years and hunter days have increased, as the population declined and the season was shortened. The season was reduced to 8 days in 2010 and then to 7 days in 2011-2012. The nonresident Region D quota was reduced from 2,100 to 1,000 licenses in 2012 to reduce harvest pressure as fawn ratios and herd size declined. Since 2010, with shorter seasons and fewer nonresident hunters, the herd has held steady at around 6,000 animals. No significant female harvest has been prescribed since 2007.

## **Population**

The 2012 postseason population estimate was approximately 6,000 and has been stable in recent years, though the herd reached a high of about 9,300 deer in 1999 and has declined since then. Postseason classification data and harvest data are applied to the model to predict population size and trends for this herd. No sightability or other population estimate data are currently available to further align the model.

The “Semi-Constant Juvenile – Semi-Constant Adult Survival (SCJ,SCA) spreadsheet model was chosen for the postseason population estimate of this herd. This model seemed the most representative of the herd in terms of trend after an adjustment was made to juvenile survival in the years 2005 and 2006. In most years it is feasible that juvenile survival is low. However, survival was thought to be higher for juveniles in 2005 and 2006, as winters were very mild. One can also reference the TSJ,CA model and note that it adjusts for high juvenile survival in these years as well. Rather than using entire the TSJ,CA model with higher penalties, the simpler SCJ,SCA model can be used by only changing juvenile survival rates for these two years. The CJ,CA model depicts a herd that is larger than managers suspect, and does not align as well with buck ratios as the SCJ,SCA model. Thus, its total fit is not as good and resulting AIC score is higher. While the SCJ,SCA model has the lowest AIC of the three models, all three models have relatively close scores. The SCJ,SCA model ultimately appears to be the best representation relative to the perceptions of managers and field personnel, is of good quality, and follows trends with license issuance and harvest success.

## **Management Summary**

Opening day for hunting the Bates Hole / Hat Six Mule Deer Herd has traditionally been October 15<sup>th</sup>, with closing dates that have changed to offer greater or lesser opportunity depending on the management direction desired. General licenses have been valid only for antlered mule deer since 2000. Doe/fawn licenses have been offered in years when winter range shrub utilization has been excessive. A short, seven-day season with no doe/fawn licenses will be instated for 2013. Nonresident Region D quotas will be reduced to 600 licenses in 2013, to compensate for the transition of several hunt areas in the region from general license to limited quota and further reduce harvest pressure region-wide. Managers have also applied an antler point restriction (APR) of three points or more on a side for this herd unit. The required selectivity of an APR season will allow yearling bucks to be recruited into mature age classes. While the APR harvest regime may improve buck ratios and quality in the short term by lowering overall harvest on bucks, it is fawn productivity and survival that must improve markedly for this herd to grow as a whole.

If we attain the projected harvest of 205 deer with fawn ratios similar to the last five years, this herd will continue to remain stable. The predicted 2013 postseason estimate for the Bates Hole Hat Six Herd is approximately 6,000 animals.

INPUT	
Species:	Deer
Biologist:	Heather O'Brien
Herd Unit & No.:	MD757 Bates Hole-Hat Six
Model date:	02/28/13

MODELS SUMMARY				Check best model to create report		Notes
				Relative AICc	Fit	
CJ,CA	Constant Juvenile & Adult Survival			121	112	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival			81	66	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival			132	13	

Population Estimates from Top Model											
Year	Posthunt Population Est.		Trend Count		Predicted Prehunt Population			Predicted Posthunt Population			Objective
	Field Est	Field SE			Juveniles	Total Males	Females	Juveniles	Total Males	Females	Total
1993					2974	1133	4947	2955	619	4604	8178
1994					2740	1117	4506	2727	912	4382	8021
1995					2793	1321	4272	2793	1040	4272	8105
1996					3992	1443	4191	3992	1105	4191	9288
1997					3563	1738	4362	3563	1437	4362	9362
1998					3258	1934	4422	3258	1474	4415	9147
1999					3559	1905	4406	3559	1294	4406	9259
2000					2650	1812	4459	2650	1215	4459	8323
2001					2847	1963	4321	2841	1043	4283	8167
2002					3473	1455	4210	3462	975	4142	8579
2003					3133	1522	4214	3117	1063	4055	8235
2004					2561	1527	4072	2543	983	3819	7355
2005					2662	1353	3756	2623	876	3495	6993
2006					1841	1859	4087	1827	1260	3928	7015
2007					2336	1848	4117	2309	1284	3984	7577
2008					2483	1554	3849	2481	1019	3841	7341
2009					2149	1363	3762	2149	788	3744	6681
2010					1624	1100	3614	1624	725	3602	5950
2011					2253	941	3388	2253	604	3388	6245
2012					2000	965	3331	2000	707	3324	6030
2013					1864	1001	3226	1864	781	3221	5865
2014											12000
2015											12000
2016											12000
2017											12000
2018											12000
2019											12000
2020											12000
2021											12000
2022											12000
2023											12000
2024											12000
2025											12000

Survival and Initial Population Estimates

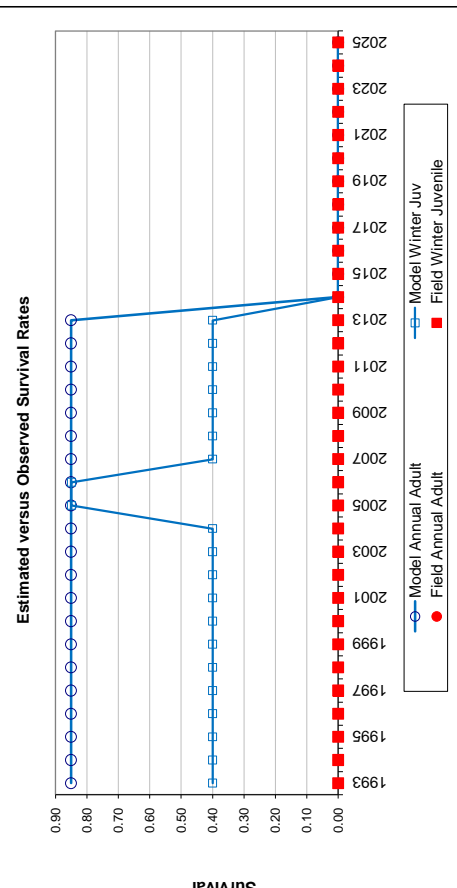
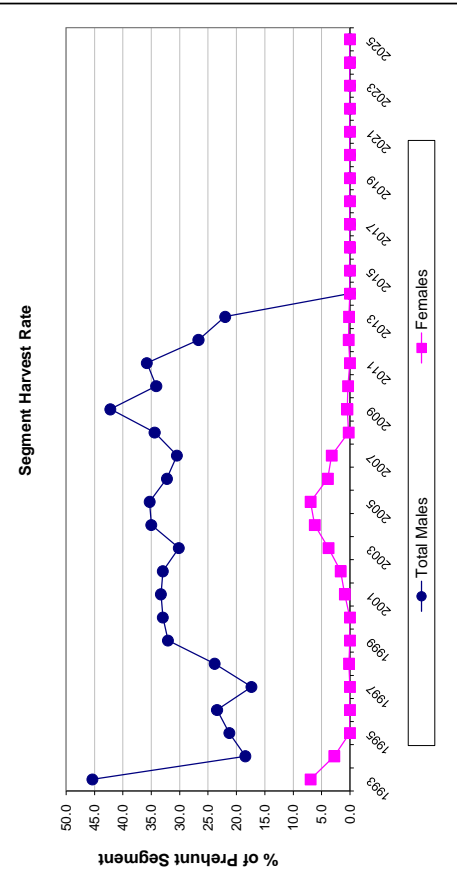
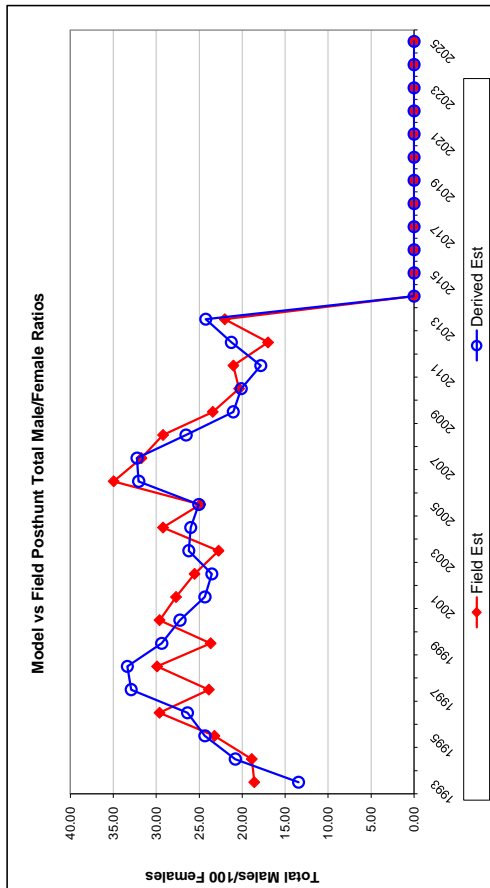
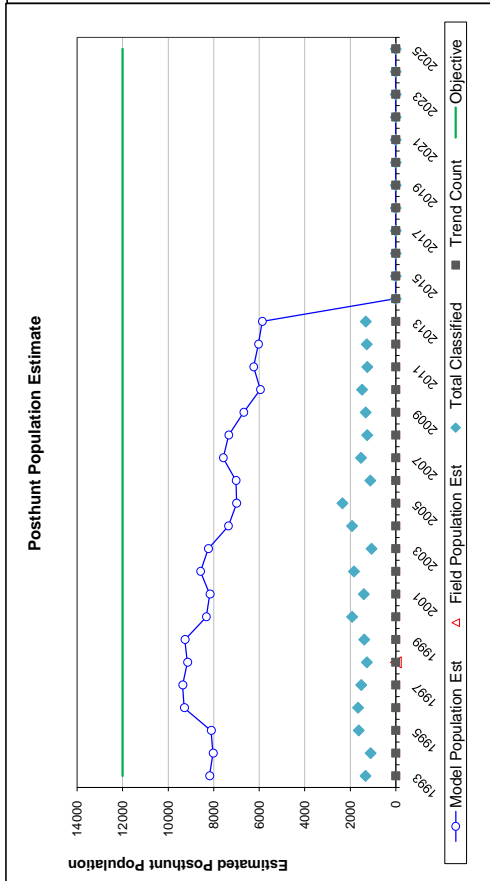
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.40		0.85	
1994	0.40		0.85	
1995	0.40		0.85	
1996	0.40		0.85	
1997	0.40		0.85	
1998	0.40		0.85	
1999	0.40		0.85	
2000	0.40		0.85	
2001	0.40		0.85	
2002	0.40		0.85	
2003	0.40		0.85	
2004	0.40		0.85	
2005	0.85		0.85	
2006	0.85		0.85	
2007	0.40		0.85	
2008	0.40		0.85	
2009	0.40		0.85	
2010	0.40		0.85	
2011	0.40		0.85	
2012	0.40		0.85	
2013	0.40		0.85	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:		Optim cells
Juvenile Survival =		0.400
Adult Survival =		0.850
Initial Total Male Pop/10,000 =		0.062
Initial Female Pop/10,000 =		0.460

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

Year	Classification Counts					Harvest				
	Juvenile/Female Ratio		Total Male/Female Ratio			Juv		Males		Total Harvest
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Males	Females	
1993		64.19	3.81	13.44	18.60	1.74	17	467	312	786
1994		62.23	4.07	20.81	18.88	1.92	12	187	113	312
1995		65.39	3.54	24.35	23.23	1.82	0	255	0	255
1996		95.24	5.03	26.38	29.62	2.28	0	307	0	307
1997		81.68	4.49	32.94	23.88	2.00	0	274	0	274
1998		73.79	4.54	33.37	29.90	2.50	0	419	6	425
1999		80.77	4.65	29.37	23.67	2.08	0	555	0	555
2000		59.43	3.06	27.25	29.62	1.95	0	543	0	543
2001		66.34	3.91	24.35	27.70	2.21	5	473	35	513
2002		83.58	4.18	23.55	25.54	1.91	10	436	62	508
2003		76.88	5.06	26.22	22.74	2.29	14	417	145	576
2004		66.60	3.37	26.00	29.21	1.96	16	486	230	732
2005		75.04	3.35	25.05	24.87	1.63	36	434	237	707
2006		46.50	3.33	32.07	34.96	2.77	13	545	144	702
2007		57.96	3.37	32.24	31.72	2.28	25	512	121	688
2008		64.61	4.05	26.54	29.21	2.42	2	486	8	496
2009		57.40	3.52	21.04	23.42	1.99	0	523	16	539
2010		45.08	2.70	20.12	20.36	1.66	0	341	11	352
2011		66.52	4.08	17.84	21.02	1.95	0	306	0	306
2012		60.17	3.66	21.28	16.99	1.66	0	234	7	241
2013		57.87	3.54	24.26	22.02	1.92	0	200	5	205
2014										
2015										
2016										
2017										
2018										
2019										
2020										
2021										
2022										
2023										
2024										
2025										

FIGURES

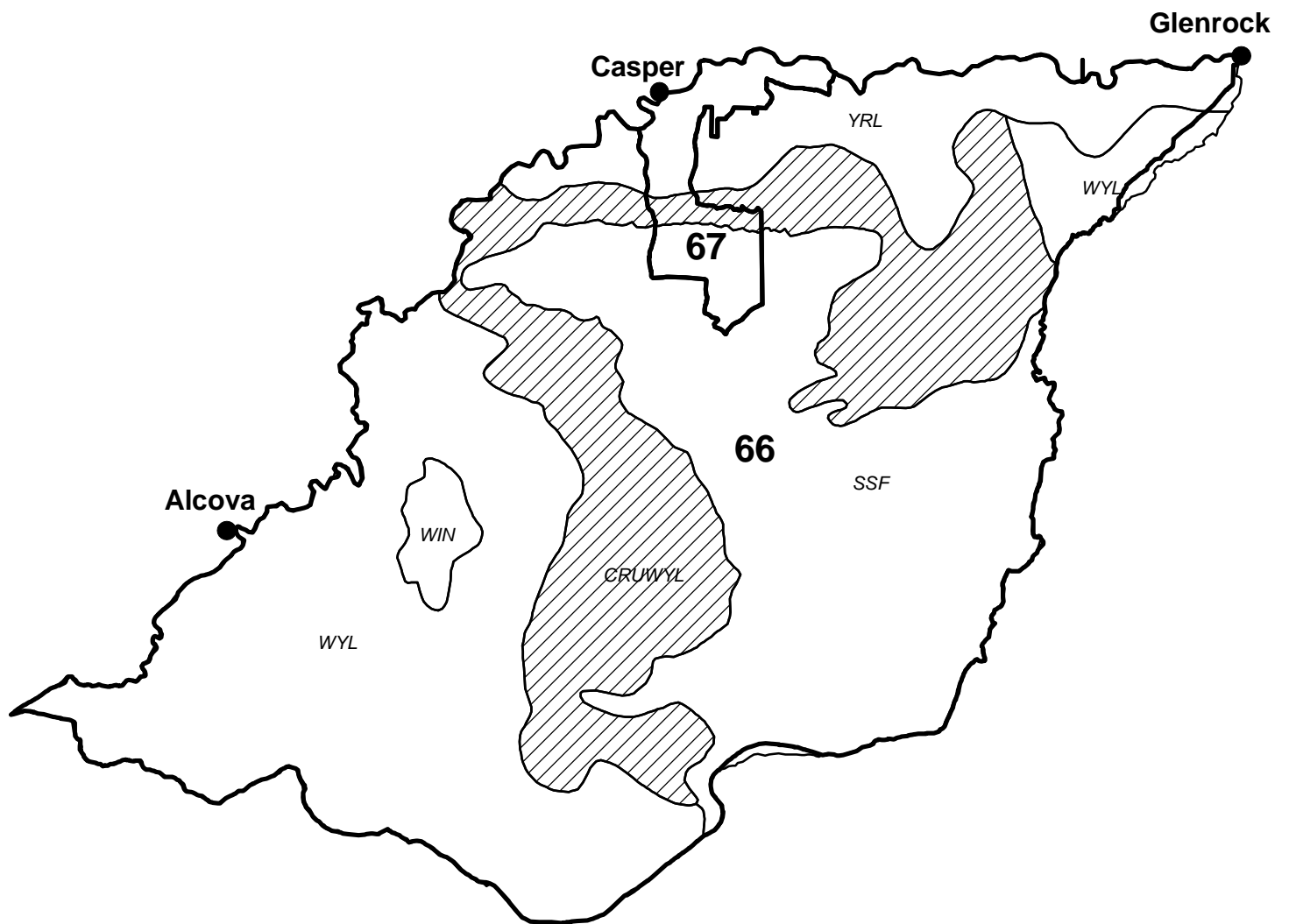


Comments:

END



Mule Deer - Bates Hole/Hat Six  
Hunt Area 66, 67  
Casper Region  
Revised 2/94





## 2012 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2012 - 5/31/2013

HERD: MD758 - RATTLESNAKE

HUNT AREAS: 88-89

PREPARED BY: HEATHER  
O'BRIEN

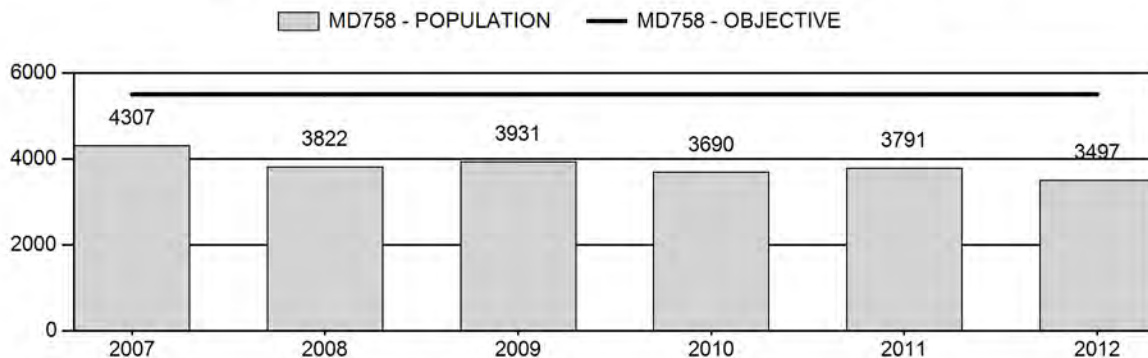
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	3,908	3,497	3,874
Harvest:	467	221	155
Hunters:	685	463	310
Hunter Success:	68%	48%	50%
Active Licenses:	750	480	300
Active License Percent:	62%	46%	52%
Recreation Days:	2,988	1,563	1,100
Days Per Animal:	6.4	7.1	7.1
Males per 100 Females	39	32	
Juveniles per 100 Females	55	47	

Population Objective:	5,500
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-36.4%
Number of years population has been + or - objective in recent trend:	19
Model Date:	5/7/2013

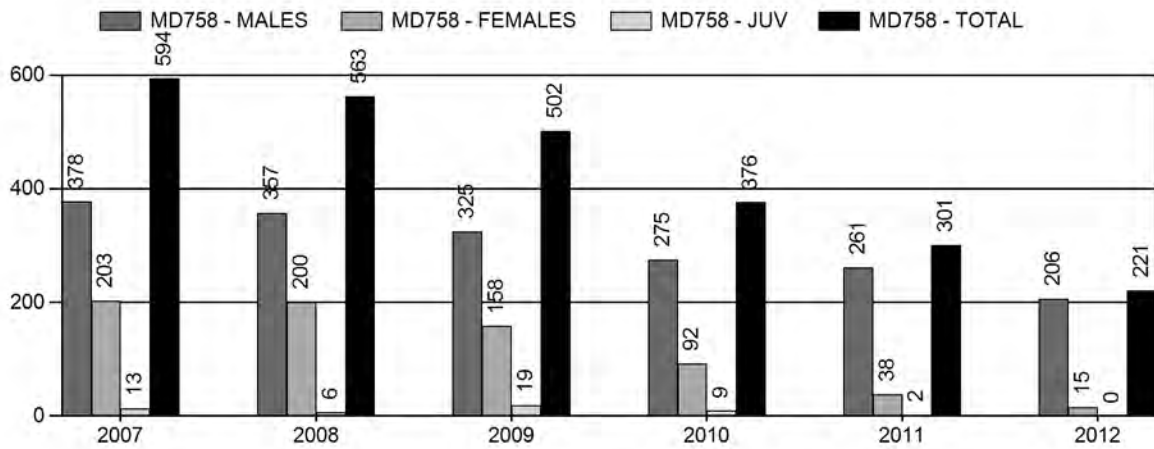
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq$ 1 year old:	.8%	.5%
Males $\geq$ 1 year old:	26.8%	17.3%
Juveniles (< 1 year old):	0%	0%
Total:	5.9%	3.8%
Proposed change in post-season population:	-9.22%	9.02%

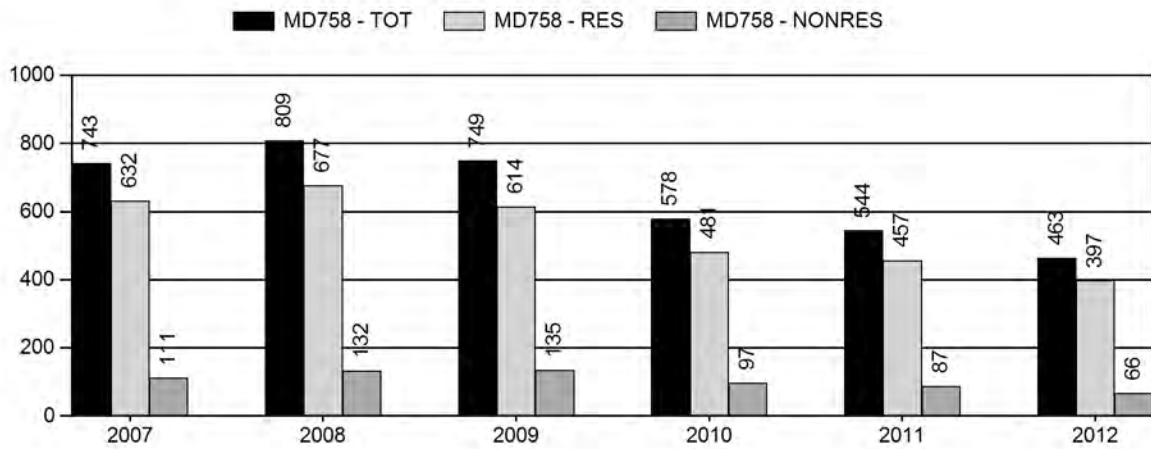
## Population Size - Postseason



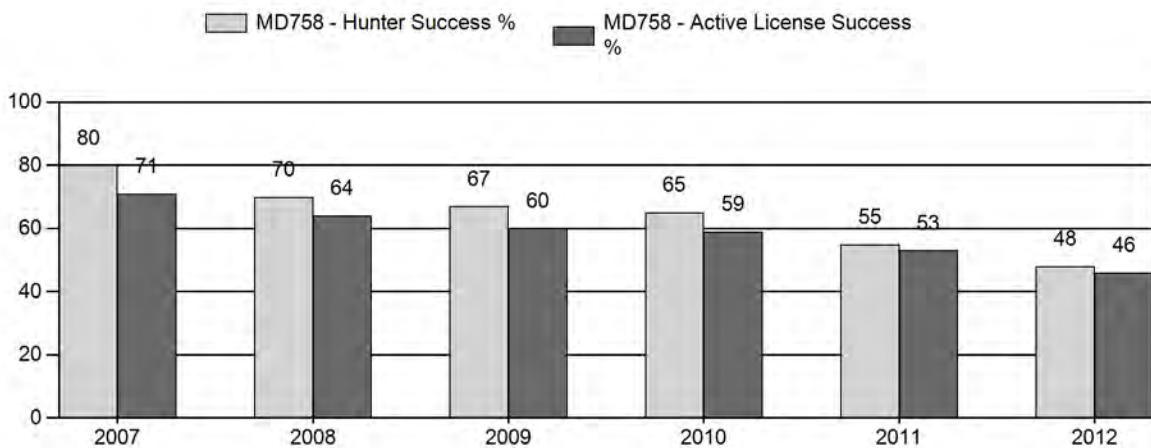
## Harvest



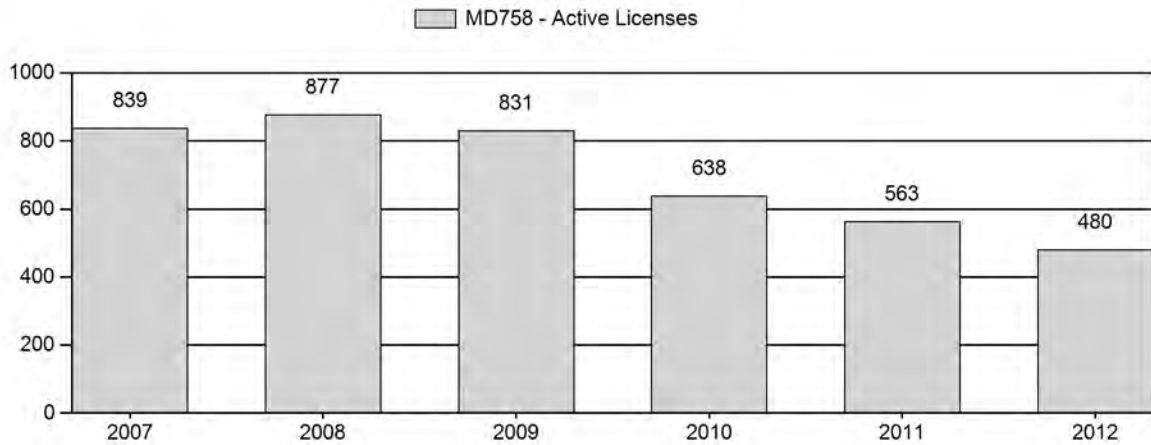
## Number of Hunters



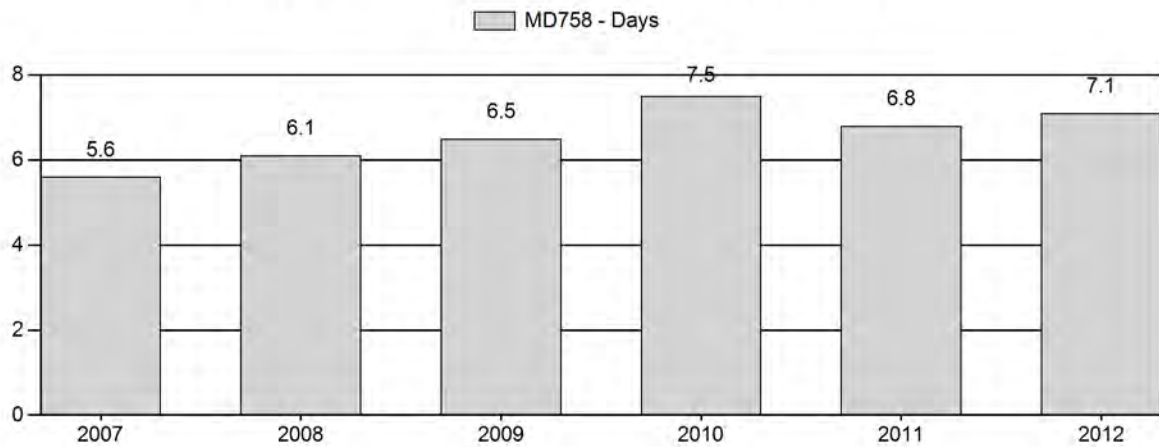
## Harvest Success



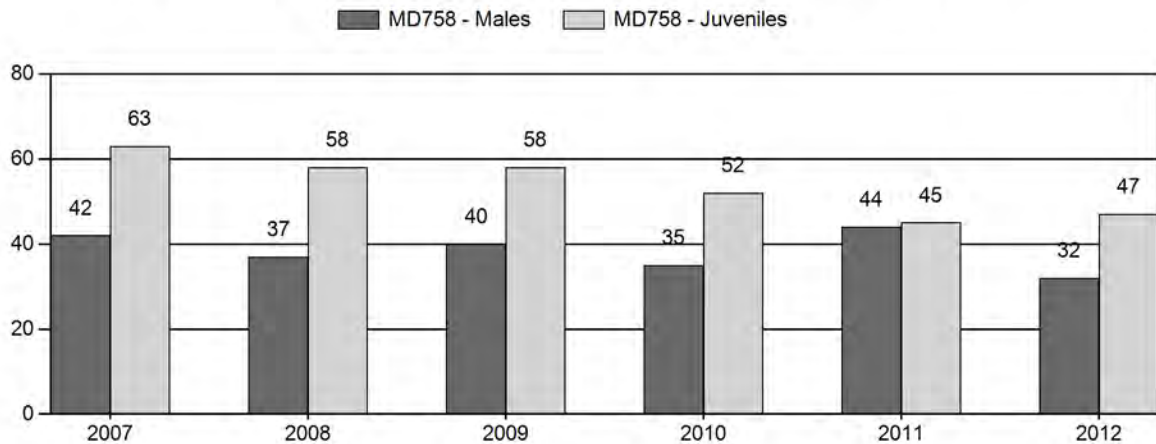
## Active Licenses



## Days per Animal Harvested



## Postseason Animals per 100 Females



**2007 - 2012 Postseason Classification Summary**

for Mule Deer Herd MD758 - RATTLESNAKE

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	4,310	50	101	151	20%	360	49%	227	31%	738	1,078	14	28	42	± 5	63	± 6	44
2008	3,824	94	185	279	19%	749	51%	434	30%	1,462	924	13	25	37	± 3	58	± 4	42
2009	3,934	34	155	189	20%	469	50%	271	29%	929	922	7	33	40	± 4	58	± 5	41
2010	3,694	49	120	169	19%	487	54%	252	28%	908	797	10	25	35	± 3	52	± 4	38
2011	3,796	53	196	249	23%	570	53%	258	24%	1,077	781	9	34	44	± 4	45	± 4	32
2012	3,501	24	81	105	18%	333	56%	156	26%	594	830	7	24	32	± 4	47	± 5	36

**2013 HUNTING SEASONS**  
**RATTLESNAKE MULE DEER (MD758)**

<b>Hunt Area</b>	<b>Type</b>	<b>Date of Seasons</b>		<b>Quota</b>	<b>Limitations</b>
<b>Opens</b>	<b>Closes</b>				
88		Oct. 15	Oct. 21		General license; antlered mule deer or any white-tailed deer
	6	Oct. 15	Nov. 30	50	Limited quota licenses; doe or fawn valid on private land
89	1	Oct. 15	Oct. 31	125	Limited quota licenses; antlered deer
Archery		Sept. 1	Sept. 30		Refer to license type and limitations in Section 3

Hunt Area	Type	Quota change from 2012
88	6	
89	1	-50
Total	1	-50
	6	0

**Management Evaluation**

**Current Postseason Population Management Objective:** 5,500

**Management Strategy:** Special

**2012 Postseason Population Estimate:** 3,500

**2013 Proposed Postseason Population Estimate:** 3,900

The Rattlesnake Mule Deer Herd Unit has a postseason population objective of 5,500 deer. The herd is managed using the special management strategy, with the goal of maintaining postseason buck ratios between 30-45 bucks per 100 does. Management of this herd unit and interpretation of harvest data can be perplexing, with different management directions for Area 88 versus 89. The objective and management strategy were last revised in 1985, and will be formally reviewed in 2014.

**Herd Unit Issues**

Hunting access within the herd unit is moderate. While there are large tracts of public lands and several large walk-in areas in Area 89, there are also many parcels of private land with restricted access. Hunt Area 88 is dominated by private lands with several small public land parcels. Traditional ranching and grazing are the primary land use over the whole unit, with scattered

areas of oil and gas development. License issuance is consistently maintained in this hunt area to address potential damage issues on irrigated agricultural fields. Periodic disease outbreaks (i.e. hemorrhagic diseases) are possible in this herd and can contribute to population declines when environmental conditions are suitable.

## **Weather**

The winter of 2011-2012 was mild with below average snow accumulations and relatively warm temperatures. The growing season of 2012 and early winter of 2013 were extremely dry with above average temperatures. During the same time period, available water, forage growth, and forage quality were below average. As a result, very poor fawn ratios of 47:100 does were observed during 2012 postseason classification surveys. Distribution of mule deer within the herd unit shifted to those few areas where water and forage were available along drainages and near reservoirs.

## **Habitat**

This herd unit has no established habitat transects that measure production and/or utilization on shrub species that are preferred browse of mule deer. Additionally, there are no comparable habitat transects in neighboring herd units to reference. Anecdotal observations and discussions with landowners in the region indicate that summer and winter forage availability was very poor in 2012. Herbaceous forage species were observed to be in extremely poor condition, which likely contributed to diminished nutrition for lactating does and their fawns.

## **Field Data**

Fawn ratios were high in this herd from 1998-2005, and the population grew in stages during this time period. License issuance was modest during this time period, until a larger number of doe/fawn licenses were introduced in Area 88 from 2003-2005. Fawn ratios were then moderate to poor from 2006-2012, and the population gradually declined over these years. Issuance of doe/fawn licenses was reduced incrementally in accordance with this decline. Harsh winter conditions in 2010-11 combined with severe drought in 2012 produced the lowest fawn ratios in over 15 years for the herd unit. Only 50 doe/fawn licenses were issued in Area 88 in 2012 to stay abreast of agricultural damage.

Buck ratios for the Rattlesnake Mule Deer Herd have been consistently maintained within special management parameters since 1999. As a result, hunters have developed high expectations for buck numbers and quality within this herd unit. Buck ratios for the herd are typically in the mid 30s per 100 does, but were as high as 44 bucks per 100 does in 2005 following several years of high fawn productivity. While this herd has dropped in overall



numbers over the past six years, buck ratios have been maintained consistently in the 30s and low 40s by adjusting Area 89 license issuance accordingly. Average tooth age of harvested bucks from 2012 hunters who submitted teeth (N=37) was 5.07, and median age was 4.5 years, indicating that mature bucks are still available for harvest within the herd. It can be difficult to maintain buck ratios over the entire herd unit, as Area 88 is managed for a low number of deer and Area 89 is managed for high mature buck ratios. Managers will continue to adjust license numbers in the herd unit so as to maintain the buck ratio within special management parameters and assure that an adequate proportion of mature bucks are available for harvest.

## **Harvest Data**

License success in this herd unit is typically in the 60-70<sup>th</sup> percentile. Success declined the last two years to 55% and 48% respectively and days per animal were higher. It can be difficult to use days per animal as a reference to population trends in this herd unit however, as hunters in Area 89 tend to be more selective of bucks and thus take more time to harvest a deer. Selectivity and low deer numbers likely combined in recent years to contribute to higher harvest days. License reductions from 275 licenses in 2008 to 175 licenses in 2011 and 2012 did not improve harvest success indicating fewer deer were available to fewer hunters. Despite lower success, hunters in Area 89 reported the highest level of satisfaction (79%) of any deer herd unit in the Casper Biologist District. Regardless, managers plan to reduce licenses further in 2013 as an effort to improve license success and maintain good buck ratios in the herd unit following exceptionally poor fawn productivity.

## **Population**

The 2012 postseason population estimate was approximately 3,500 and trending downward from an estimated high of 4,800 deer in 2005. Postseason classification data and harvest data are applied to the model to predict population size and trends for this herd. No sightability or other population estimate data are currently available to further align the model.

The “Time-Specific Juvenile Survival – Constant Adult Survival” (TSJ,CA) spreadsheet model was selected for the postseason population estimate of this herd. This model seemed most representative of the herd, as it mirrors fluctuations in herd size observed by field personnel in previous years. The simpler models (CJ,CA and SCA,CA) select for the lowest constraint on juvenile survival but predict overall population sizes that are unreasonably high for the Rattlesnake Herd. If constraints on juvenile or adult survival are manipulated within acceptable ranges, these two models still do not track with known trends for the population. While the AIC for the TSJ,CA model is the highest of the three, it is only due to year-by-year penalties on juvenile survival and is still within one order of magnitude of the simpler models. The TSJ,CA model appears to be the best representation relative to the perceptions of managers on the ground

and follows trends with license issuance and harvest success, and is considered to be of good quality.

### **Management Summary**

Traditional season dates in this herd run from October 15<sup>th</sup> through October 31<sup>st</sup>, and November 30<sup>th</sup> for Area 88 Type 6 licenses. The same season dates will be applied to the 2013 hunting season, with a reduction of Area 89-Type 1 licenses to track with poor fawn ratios and declining buck ratios. Area 88 Type 6 licenses will be valid on private land only. The 2013 season thus includes a total of 125 Type 1 licenses in Area 89, a general season in Area 88 for antlered mule deer or any white-tailed deer, and 50 Type 6 licenses valid in Area 88. While fawn ratios and population growth rates have been poor in recent years, habitat conditions are also poor due to recent drought. Goals for 2013 are to improve deer numbers gradually towards objective while giving time for habitats to recover, to improve buck ratios, and increase hunter success.

If we attain the projected harvest of 155 deer with fawn ratios similar to the five-year average, this herd will increase slightly in number. The predicted 2013 postseason population size for the Rattlesnake Mule Deer Herd Unit is approximately 3,900 deer.

INPUT

Species:Deer

Biologist:Heather O'Brien

Herd Unit & No.:Rattlesnake M/D

Model date:02/28/13

☐ Clear form

MODELS SUMMARY				Notes
		Fit	Relative AICc	Check best model to create report
CJ,CA	Constant Juvenile & Adult Survival	44	53	<input type="checkbox"/> CJ,CA Model
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	46	60	<input type="checkbox"/> SCJ,SCA Mod
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	9	127	<input type="checkbox"/> TSJ,CA Model

Population Estimates from Top Model												
Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population			Predicted Posthunt Population			Total	Objective	
	Field Est	Field SE		Juveniles	Total Males	Females	Juveniles	Total Males	Females			
1993				1163	617	2174	3955	1141	213	1958	3311	5500
1994				849	569	2054	3472	812	389	1835	3036	5500
1995				986	610	1841	3436	971	456	1768	3195	5500
1996				1689	597	1714	4000	1689	511	1714	3915	5500
1997				1559	773	1797	4129	1539	538	1706	3783	5500
1998				1217	766	1760	3742	1210	420	1694	3324	5500
1999				1519	902	1987	4408	1510	620	1872	4002	5500
2000				1185	953	2019	4156	1167	663	1873	3703	5500
2001				1305	879	1908	4092	1305	639	1817	3761	5500
2002				1397	844	1847	4089	1374	610	1735	3719	5500
2003				1345	794	1752	3891	1339	569	1642	3550	5500
2004				1506	930	1844	4281	1492	647	1744	3883	5500
2005				1827	1222	2156	5205	1816	890	2053	4759	5500
2006				1244	1243	2233	4720	1240	883	2090	4213	5500
2007				1339	1297	2324	4961	1325	881	2101	4307	5500
2008				1137	1133	2171	4442	1131	740	1951	3822	5500
2009				1174	1139	2170	4483	1153	782	1996	3931	5500
2010				1022	1024	2058	4103	1012	721	1956	3690	5500
2011				943	1069	2121	4133	941	772	2078	3791	5500
2012				937	846	1957	3740	937	619	1941	3497	5500
2013				1074	923	2048	4045	1074	763	2037	3874	5500
2014												5500
2015												5500
2016												5500
2017												5500
2018												5500
2019												5500
2020												5500
2021												5500
2022												5500
2023												5500
2024												5500
2025												5500

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est SE	Model Est	Field Est SE
1993	0.68		0.85	
1994	0.69		0.85	
1995	0.43		0.85	
1996	0.40		0.85	
1997	0.40		0.85	
1998	0.90		0.85	
1999	0.56		0.85	
2000	0.54		0.85	
2001	0.46		0.85	
2002	0.40		0.85	
2003	0.67		0.85	
2004	0.90		0.85	
2005	0.53		0.85	
2006	0.88		0.85	
2007	0.58		0.85	
2008	0.90		0.85	
2009	0.62		0.85	
2010	0.90		0.85	
2011	0.40		0.85	
2012	0.84		0.85	
2013	0.50		0.85	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:

Optim cells

Adult Survival = 0.851

Initial Total Male Pop/10,000 = 0.021

Initial Female Pop/10,000 = 0.196

MODEL ASSUMPTIONS

Sex Ratio (% Males) = 50%

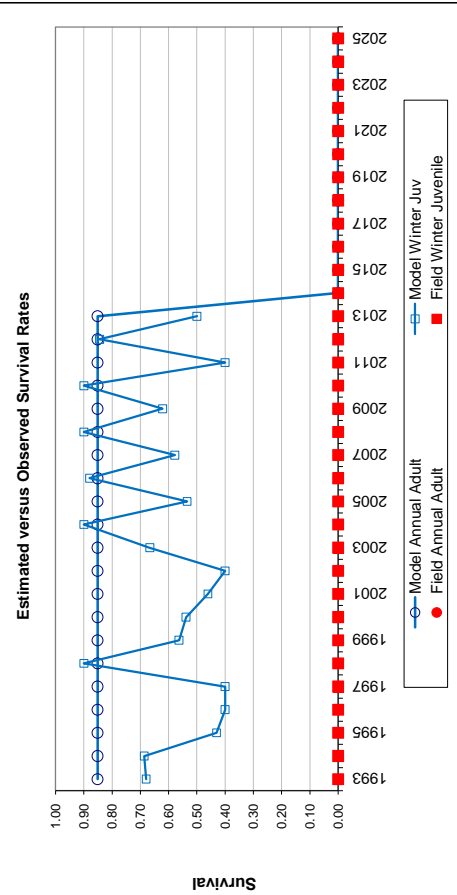
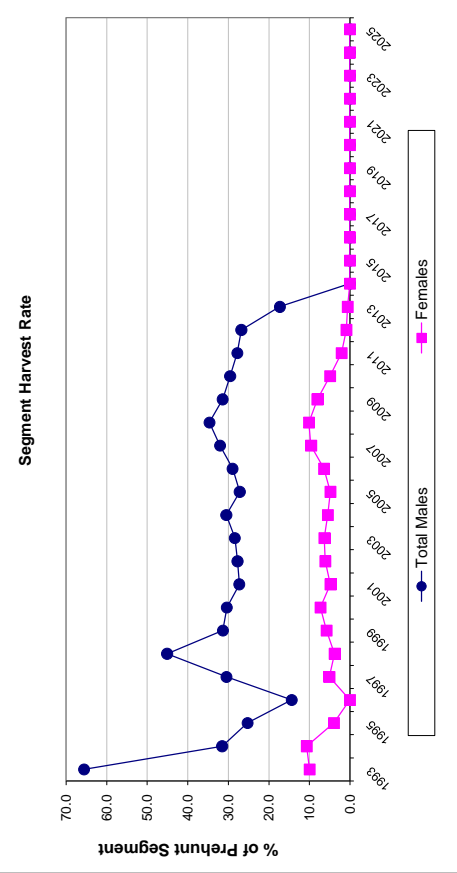
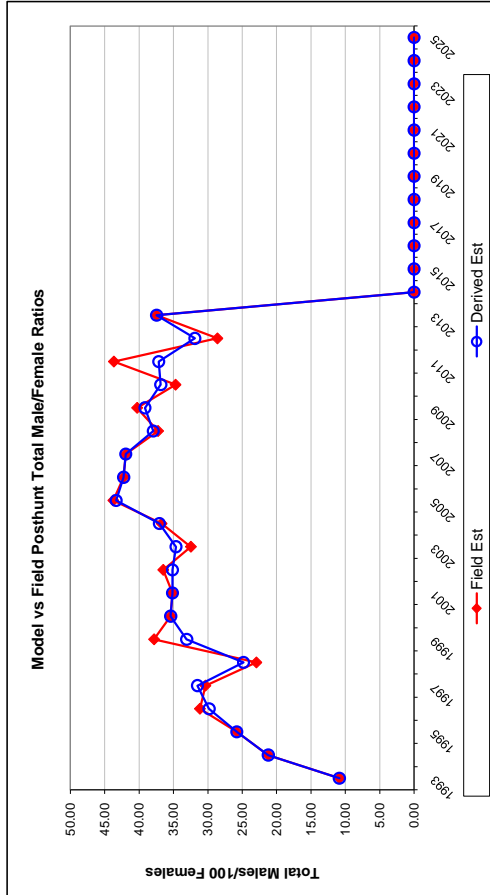
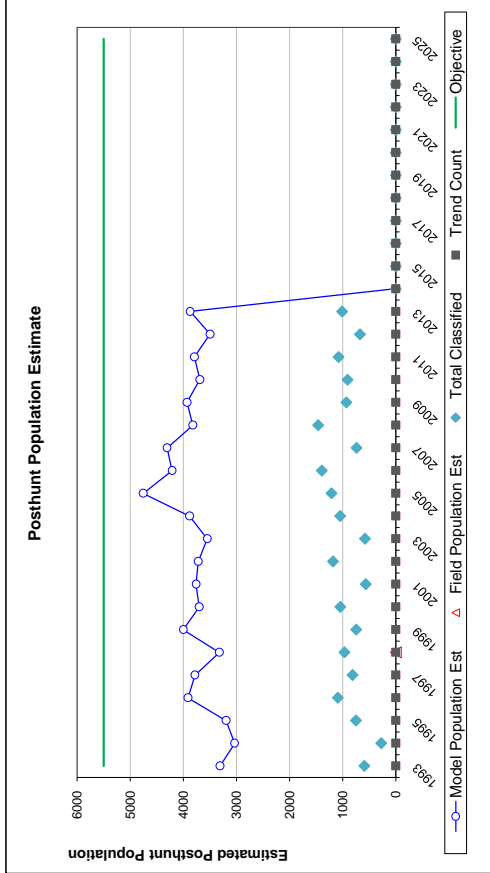
Wounding Loss (total males) = 10%

Wounding Loss (females) = 10%

Wounding Loss (juveniles) = 10%

Year	Classification Counts					Harvest				
	Juvenile/Female Ratio		Total Male/Female Ratio			Juv		Males		Total Harvest
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Males	Females	
1993		58.29	5.13	10.86	10.86	1.85	20	368	197	565
1994		44.24	6.22	21.21	21.21	3.95	34	163	199	362
1995		54.94	4.53	25.78	25.78	2.80	13	140	66	206
1996		98.53	6.42	29.83	31.16	2.93	0	78	0	78
1997		90.24	6.82	31.52	30.35	3.27	18	214	83	297
1998		71.43	4.96	24.80	22.94	2.38	6	314	60	374
1999		80.65	6.54	33.09	37.83	3.91	8	257	104	361
2000		62.31	4.38	35.42	35.42	3.01	16	263	133	412
2001		71.79	6.72	35.17	35.16	4.17	0	218	83	301
2002		79.20	5.09	35.16	36.50	3.02	21	213	102	315
2003		81.55	7.39	34.64	32.47	3.98	5	205	100	305
2004		85.56	5.81	37.08	36.73	3.27	13	258	91	349
2005		88.48	5.66	43.34	43.76	3.47	10	302	94	396
2006		59.33	3.70	42.26	42.26	2.95	4	327	130	457
2007		63.06	5.34	41.95	41.94	4.07	13	378	203	581
2008		57.94	3.50	37.94	37.25	2.61	6	357	200	557
2009		57.78	4.41	39.15	40.30	3.47	19	325	158	483
2010		51.75	4.02	36.86	34.70	3.10	9	275	92	367
2011		45.26	3.40	37.17	43.68	3.32	2	270	39	309
2012		48.29	4.34	31.90	28.61	3.11	0	206	15	221
2013		52.73	3.89	37.47	37.48	3.11	0	145	10	155
2014										
2015										
2016										
2017										
2018										
2019										
2020										
2021										
2022										
2023										
2024										
2025										

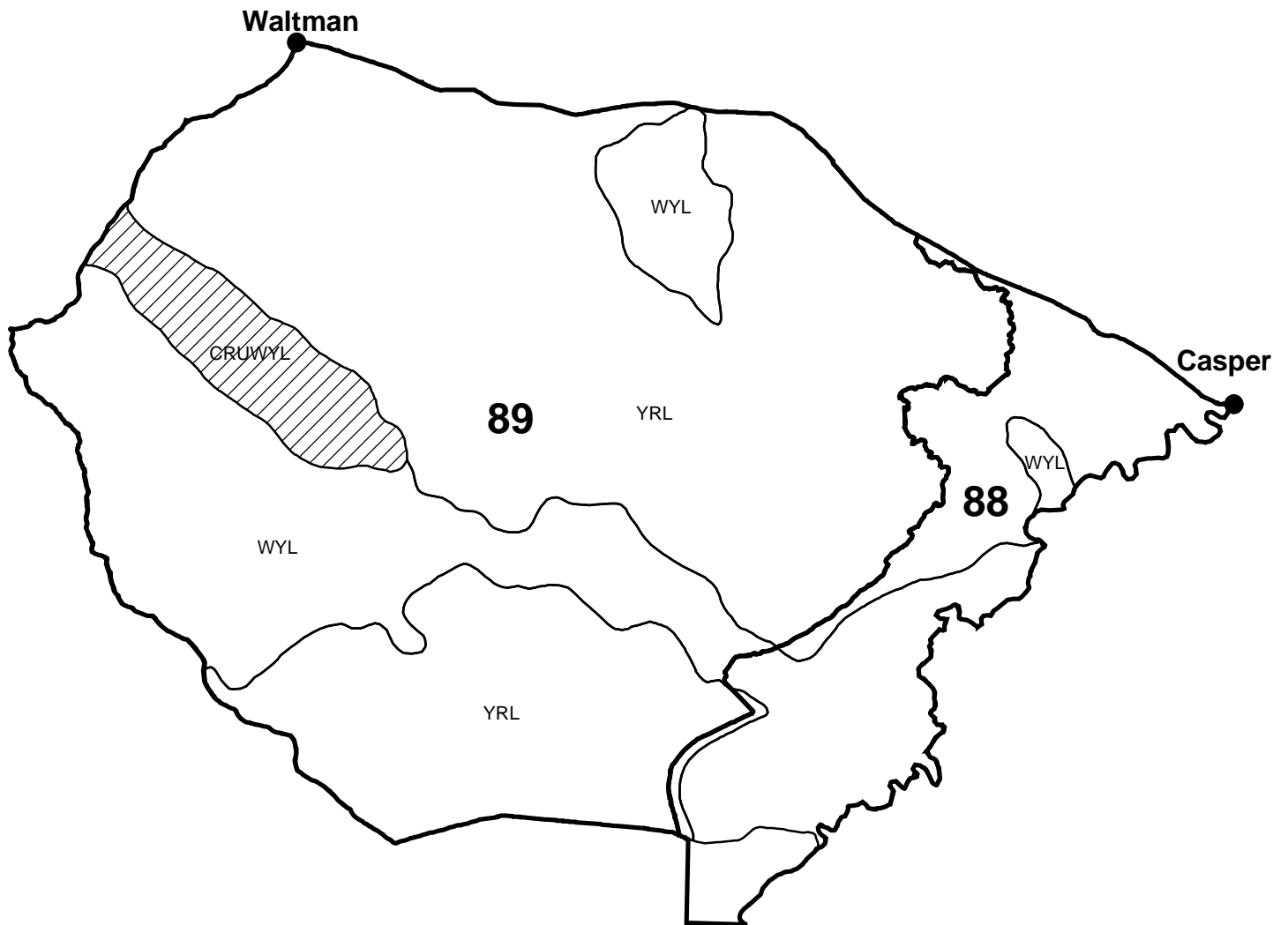
FIGURES



Comments:

END

Mule Deer - Rattlesnake  
Hunt Areas 88, 89  
Casper Region  
Revised 4/88







## 2012 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2012 - 5/31/2013

HERD: MD759 - NORTH NATRONA

HUNT AREAS: 34

PREPARED BY: HEATHER  
O'BRIEN

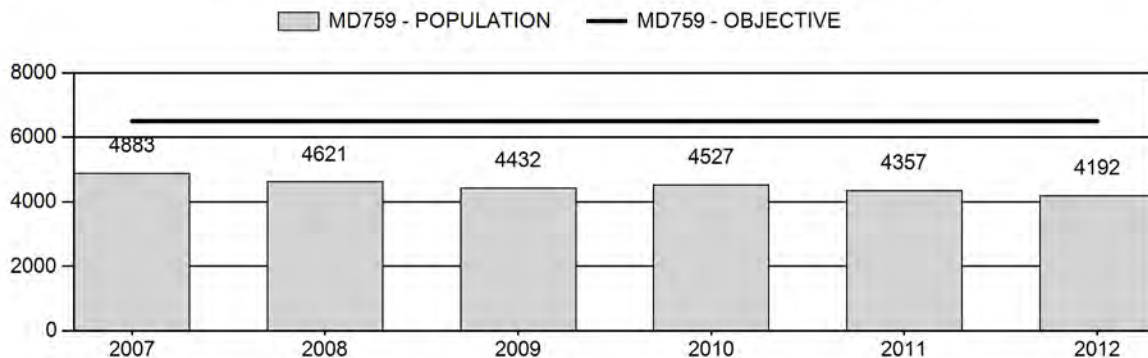
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	4,564	4,192	4,234
Harvest:	285	196	200
Hunters:	361	256	255
Hunter Success:	79%	77%	78%
Active Licenses:	385	268	266
Active License Percent:	74%	73%	75%
Recreation Days:	1,541	1,188	1,200
Days Per Animal:	5.4	6.1	6
Males per 100 Females	38	30	
Juveniles per 100 Females	50	42	

Population Objective: 6,500  
 Management Strategy: Special  
 Percent population is above (+) or below (-) objective: -35.5%  
 Number of years population has been + or - objective in recent trend: 19  
 Model Date: 5/7/2013

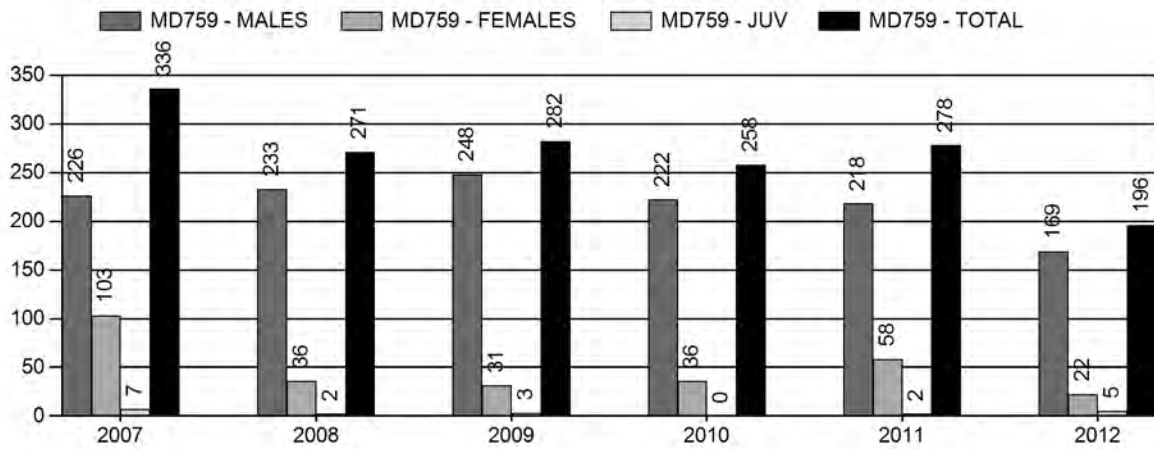
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq$ 1 year old:	1%	1%
Males $\geq$ 1 year old:	18.6%	19.4%
Juveniles (< 1 year old):	.4%	.7%
Total:	4.49%	4.44%
Proposed change in post-season population:	-3.8%	1.0%

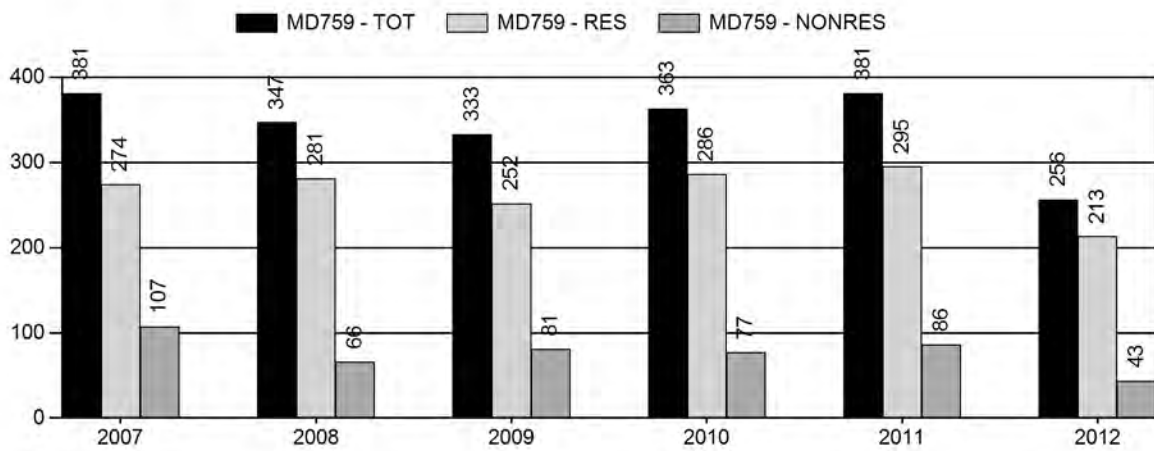
## Population Size - Postseason



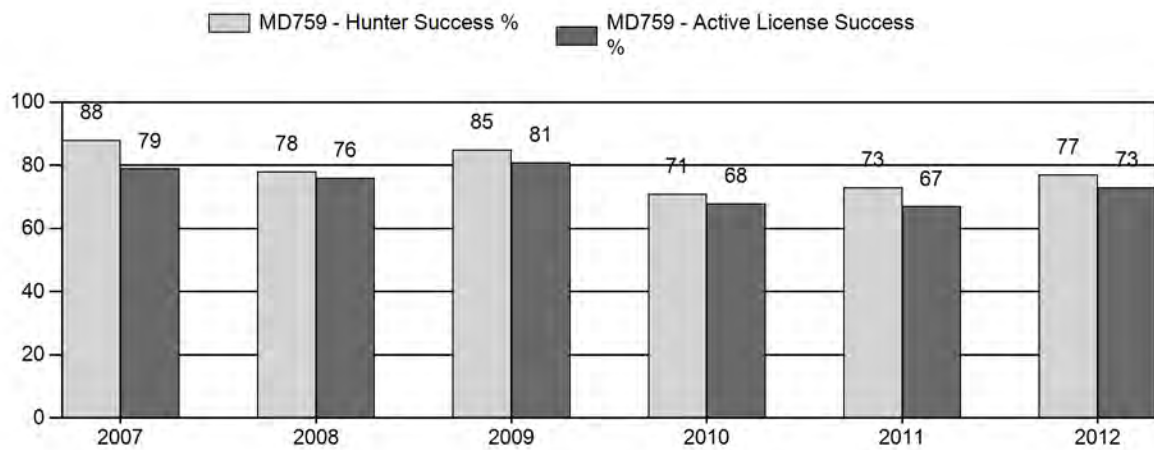
## Harvest



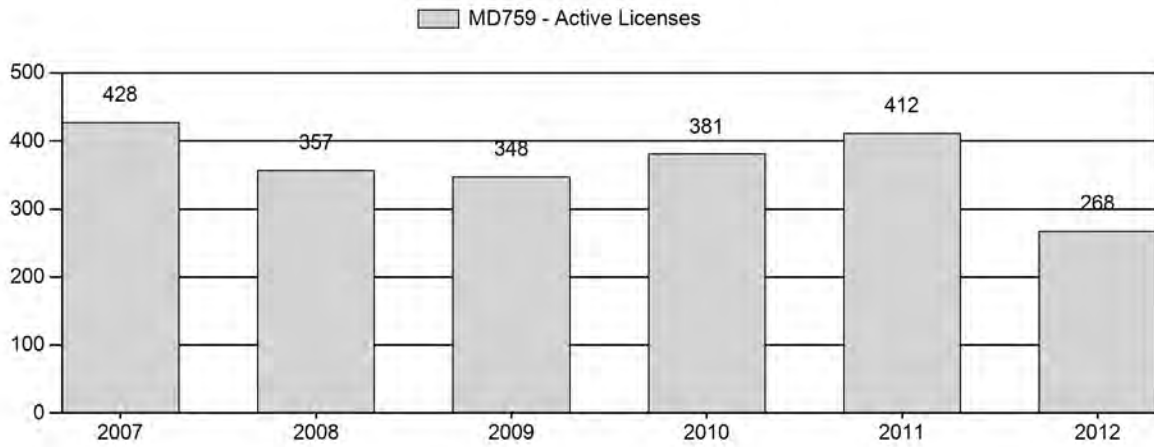
## Number of Hunters



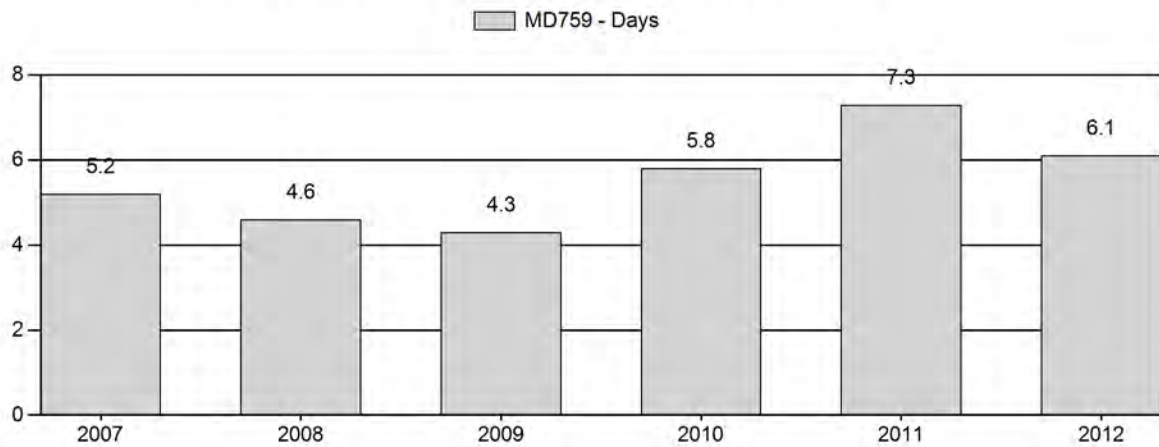
## Harvest Success



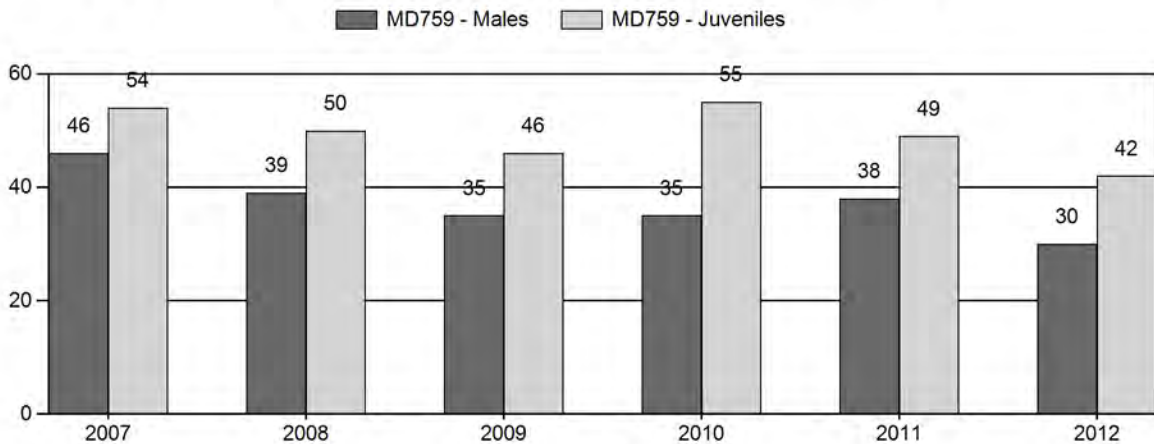
## Active Licenses



## Days per Animal Harvested



## Postseason Animals per 100 Females



**2007 - 2012 Postseason Classification Summary**

for Mule Deer Herd MD759 - NORTH NATRONA

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	4,887	55	59	114	23%	247	50%	134	27%	495	820	22	24	46	± 6	54	± 7	37
2008	4,626	59	152	211	21%	543	53%	269	26%	1,023	760	11	28	39	± 4	50	± 4	36
2009	4,438	51	144	195	19%	558	55%	256	25%	1,009	668	9	26	35	± 3	46	± 4	34
2010	4,533	47	120	167	18%	476	53%	262	29%	905	830	10	25	35	± 4	55	± 5	41
2011	4,364	52	102	154	20%	406	53%	200	26%	760	851	13	25	38	± 4	49	± 5	36
2012	4,199	36	117	153	18%	503	58%	212	24%	868	760	7	23	30	± 3	42	± 4	32

**2013 HUNTING SEASONS**  
**NORTH NATRONA MULE DEER HERD (MD759)**

<b>Hunt Area</b>	<b>Type</b>	<b>Date of Seasons</b>		<b>Quota</b>	<b>Limitations</b>
<b>Opens</b>	<b>Closes</b>				
34	1	Oct. 15	Oct. 31	250	Limited quota licenses; antlered deer
	3	Oct. 15	Nov. 31	50	Limited quota licenses; any white-tailed deer
	6	Oct. 15	Oct. 31	50	Limited quota; doe or fawn valid on private land east of the Bucknum Road (Natrona County Road 125) within the Casper Creek Drainage
	8	Oct. 15	Nov. 31	100	Limited quota; doe or fawn white-tailed deer
Archery		Sept. 1	Sept. 30		Refer to license types and limitations in Section 3

Hunt Area	Type	Quota change from 2012
34	1	0
	3	0
	6	0
	8	-100

**Management Evaluation**

**Current Postseason Population Management Objective:** 6,500

**Management Strategy:** Special

**2012 Postseason Population Estimate:** 4,200

**2013 Proposed Postseason Population Estimate:** 4,200

The North Natrona Herd Unit has a postseason population management objective of 6,500 mule deer. The herd is managed using the special management strategy, with the goal of maintaining postseason buck ratios between 30-45 bucks per 100 does. The objective and management strategy were last revised in 1988, and will be formally reviewed in 2014.

## **Herd Unit Issues**

Hunting access within the herd unit is very good, with large tracts of public land as well as walk-in areas available for hunting. The southeastern corner of the herd unit is the only area dominated by private lands. In this area, specific doe/fawn licenses have been added to address damage issues on irrigated agricultural fields. The main land use within the herd unit is traditional ranching and grazing of livestock. Industrial-scale developments, including oil and gas development, are limited and isolated within this herd unit.

## **Weather**

The winter of 2011-2012 was mild with below average snow accumulations and relatively warm temperatures. The growing season of 2012 through early winter of 2013 were extremely dry with above average temperatures. During the same time period, available water, forage growth, and forage quality were below average. As a result, very poor fawn ratios of 42:100 were observed during 2012 postseason classification surveys.

## **Habitat**

This herd unit contains five habitat transects which measure annual production of curl leaf mountain mahogany (*Cercocarpus ledifolius*). In the fall of 2012, average leader growth was only .52 inches (13 mm), which was the poorest year for growth since 2002. Average leader growth from 2001-2011 was 1.27 inches (32 mm) by comparison. Poor leader growth on habitat transects corroborates field observations of a general lack of 2012-2013 winter forage, with the possible exception of areas at higher elevations within this herd unit. Herbaceous forage species were also observed to be in poor condition, which likely contributed to diminished nutrition for lactating does and their fawns.

## **Field Data**

Fawn ratios were moderate (55-66 per 100 does) in this herd from 1998-2002, and license issuance during this time was higher with an emphasis on buck harvest. During the mild years of 2003-2005, fawn ratios were quite high (73-89 per 100 does). License issuance was very moderate during this time, and the population grew to a high of approximately 5,500 animals. From 2006-present, fawn ratios were moderate to poor, and reached a 15-year low in 2012. Consequently, license issuance was gradually lowered to track with diminished fawn production. The herd has been relatively stable near 4,000 animals from 2007-2012.

Buck ratios for the North Natrona Herd historically average in the mid 30s per 100 does. In 2012, observed buck ratios were on the cusp of special management, with 30 bucks per hundred

does. Type 1 license issuance remained stable at 350 since 2001, but was reduced to 250 in 2012. Managers intend to keep Type 1 licenses consistent at 250 for an additional year. If buck ratios drop below 30 following the 2013 harvest due to declining fawn productivity, licenses will be further reduced to compensate and manage the buck ratio back within special management parameters.

## **Harvest Data**

Hunter success in the North Natrona Mule Deer Herd Unit is typically in the 70-80<sup>th</sup> percentile, and was 78% in 2012. While harvest success has remained average for the herd in recent years, days per animal have increased. Increasing days per animal typically indicate a shrinking population, as it takes hunters more time to find and harvest fewer animals. However survey totals, comments from hunters and landowners, and population modeling all indicate this herd has remained relatively stable. Thus, managers suspect hunters are being more selective, as the herd has developed a reputation of having high quality mature bucks. The low buck ratio in 2012 may have also contributed to increased hunter days in that year, but in all other years the buck ratio was well within special management limits.

## **Population**

The 2012 postseason population estimate was approximately 4,200 and trending slightly downward after an estimated high of 5,200 deer in 2005. Postseason classification data and harvest data are applied to the model to predict population size and trends for this herd. No sightability or other population estimate data are currently available to further align the model.

The “Constant Juvenile Survival – Constant Adult Survival” (CJ,CA) spreadsheet model was chosen for the postseason population estimate of this herd. This model is the simplest and appears to be most representative of trends within the herd. The CJ,CA model selects adult survival rates that seem reasonable for this herd, but only if the juvenile survival rate is increased slightly. The lower constraint for juvenile survival was thus increased from 0.4 to 0.5. Managers believe this to be an acceptable adjustment, as it is small and accounts for slightly milder habitat and winter conditions, and produces a trend that tracks with observed fawn and buck ratios. The SCJ,SCA model is unnecessary since the simpler model tracks well with the herd unit. The TSJ,CA model, while it trends well with observed population dynamics, does not match trends reported for earlier years when the population was estimated to be larger, and both license issuance and harvest success were higher. All three models have AICs that are low and well within one magnitude of power of each other. Thus, AIC has little bearing on model selection for this herd. The CJ,CA model is considered to be of good quality in representing population trends and estimates for this herd and based on established model criteria.

## **Management Summary**

Traditional season dates in this herd run for two weeks from October 15<sup>th</sup> through October 31<sup>st</sup>. The 2013 season follows the same season dates with 250 Type 1 and 50 Type 6 licenses, which is the same license issuance as 2012. Type 6 licenses will be valid on private lands in the southeastern corner of the hunt area, and are intended to address damage issues on agricultural fields. The only season change is the limitation of Type 6 license use to private lands only. This limitation will ensure that licenses to address agricultural damage and are not used to harvest does on public lands where they are not a damage issue.

If we attain the projected harvest of 200 mule deer with fawn ratios similar to the past 5 years, this herd will remain stable as it has for the past 5 years. The predicted 2013 postseason population size of the North Natrona Mule Deer Herd is approximately 4,200 animals.



INPUT

Species:  
Biologist:  
Herd Unit & No.:  
Model date:

Deer  
Heather O'Brien  
MD 759 North Natrona  
03/04/13

☐ Clear form

MODELS SUMMARY				Notes
		Fit	Relative AICc	Check best model to create report
CJ,CA	Constant Juvenile & Adult Survival	29	38	<input type="checkbox"/> CJ,CA Model
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	26	35	<input type="checkbox"/> SCJ,SCA Mod
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	5	123	<input type="checkbox"/> TSJ,CA Model

Population Estimates from Top Model												
Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population			Total	Predicted Posthunt Population			Total	Objective
	Field Est	Field SE		Juveniles	Total Males	Females		Juveniles	Total Males	Females		
1993				905	881	2435	4220	887	540	2234	3661	6500
1994				1202	699	2196	4096	1197	470	2093	3761	6500
1995				1429	715	2149	4293	1418	476	2037	3931	6500
1996				1684	775	2155	4614	1684	572	2095	4352	6500
1997				1485	926	2273	4685	1473	654	2221	4348	6500
1998				1266	946	2331	4543	1266	694	2285	4245	6500
1999				1350	930	2336	4616	1345	663	2230	4238	6500
2000				1225	922	2307	4454	1210	538	2225	3973	6500
2001				1447	778	2269	4494	1437	594	2164	4196	6500
2002				1234	885	2272	4391	1232	645	2204	4081	6500
2003				1668	878	2256	4801	1658	679	2208	4545	6500
2004				2034	1014	2366	5414	2032	747	2289	5068	6500
2005				1775	1168	2531	5473	1770	918	2431	5119	6500
2006				1130	1254	2591	4975	1128	967	2501	4596	6500
2007				1624	1137	2492	5252	1616	888	2379	4883	6500
2008				1224	1189	2506	4919	1222	932	2466	4621	6500
2009				1128	1130	2485	4742	1124	857	2451	4432	6500
2010				1325	1038	2447	4811	1325	794	2408	4527	6500
2011				1178	1033	2459	4670	1176	795	2386	4357	6500
2012				1008	997	2403	4408	1003	811	2379	4192	6500
2013				1134	967	2353	4454	1125	779	2330	4234	6500
2014												6500
2015												6500
2016												6500
2017												6500
2018												6500
2019												6500
2020												6500
2021												6500
2022												6500
2023												6500
2024												6500
2025												6500

Survival and Initial Population Estimates

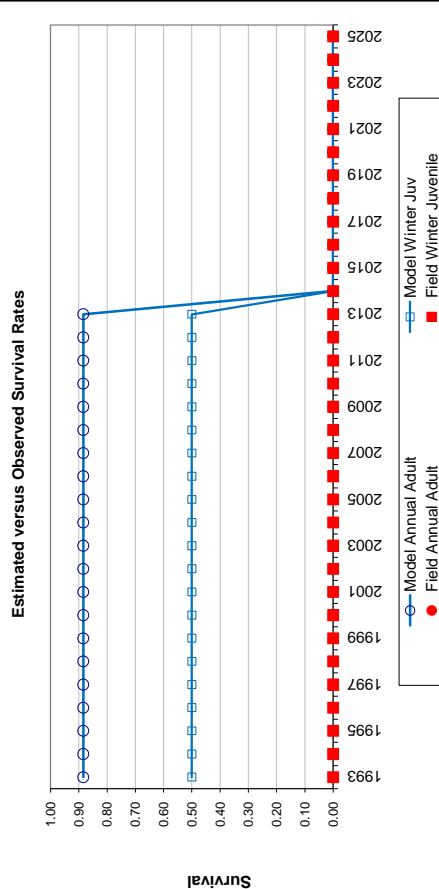
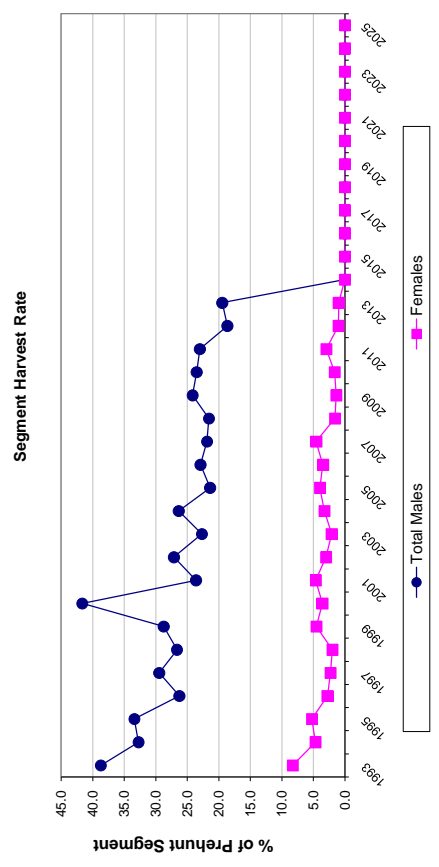
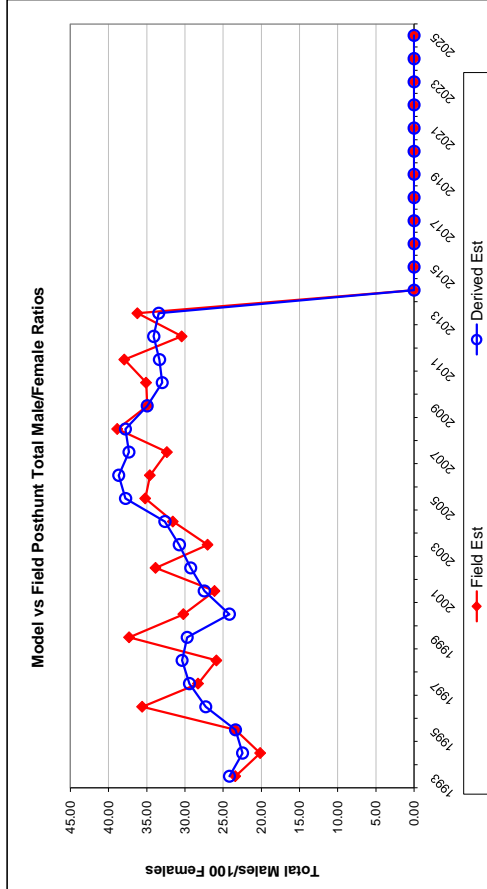
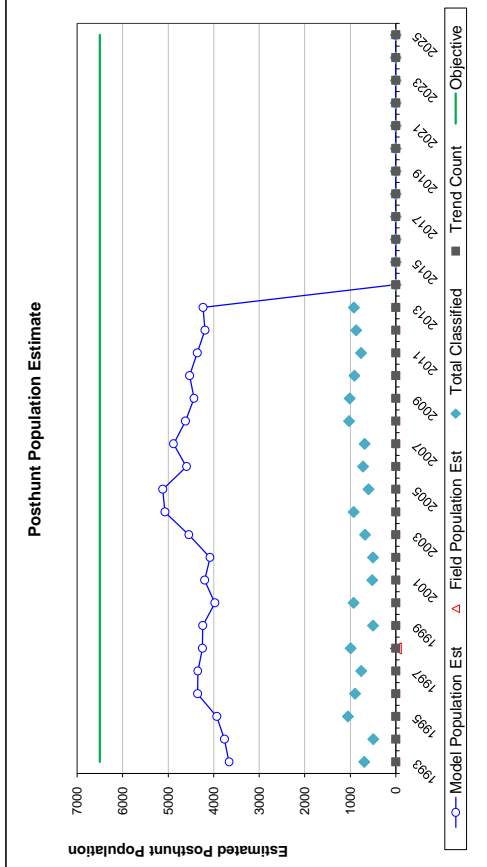
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.50		0.88	
1994	0.50		0.88	
1995	0.50		0.88	
1996	0.50		0.88	
1997	0.50		0.88	
1998	0.50		0.88	
1999	0.50		0.88	
2000	0.50		0.88	
2001	0.50		0.88	
2002	0.50		0.88	
2003	0.50		0.88	
2004	0.50		0.88	
2005	0.50		0.88	
2006	0.50		0.88	
2007	0.50		0.88	
2008	0.50		0.88	
2009	0.50		0.88	
2010	0.50		0.88	
2011	0.50		0.88	
2012	0.50		0.88	
2013	0.50		0.88	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:		Optim cells
Juvenile Survival =		0.500
Adult Survival =		0.884
Initial Total Male Pop/10,000 =		0.054
Initial Female Pop/10,000 =		0.223

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

Year	Classification Counts					Harvest				
	Juvenile/Female Ratio		Total Male/Female Ratio			Juv		Total Harvest		Segment Harvest Rate (% of Total Males
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Males	Females	
1993		39.72	3.62	24.18	23.40	2.61	16	310	183	38.7
1994		57.19	5.69	22.46	20.14	2.95	4	208	93	32.7
1995		69.61	4.66	23.37	23.39	2.31	10	217	102	33.4
1996		80.39	5.93	27.29	35.59	3.42	0	185	54	26.2
1997		66.32	5.33	29.43	28.28	3.05	11	248	47	29.4
1998		55.41	3.98	30.37	25.87	2.44	0	229	42	26.6
1999		60.32	6.19	29.71	37.30	4.51	4	243	96	28.7
2000		54.40	4.10	24.18	30.20	2.80	13	349	75	43.7
2001		66.42	6.42	27.46	26.12	3.51	9	167	95	23.6
2002		55.89	5.76	29.26	33.84	4.15	2	218	62	27.1
2003		75.08	6.28	30.73	27.03	3.21	9	181	43	22.7
2004		88.76	6.33	32.63	31.58	3.15	2	243	70	26.4
2005		72.82	6.62	37.78	35.19	4.07	4	227	91	21.4
2006		45.11	4.05	38.67	34.59	3.42	2	261	82	22.9
2007		67.94	5.79	37.33	32.35	3.55	7	226	103	34.5
2008		49.54	3.69	37.81	38.86	3.15	2	233	36	21.9
2009		45.88	3.46	34.95	34.95	2.91	3	248	31	21.6
2010		55.04	4.23	32.98	35.08	3.16	0	222	36	24.2
2011		49.26	4.26	33.33	37.93	3.59	2	216	66	23.5
2012		42.15	3.45	34.09	30.42	2.81	5	169	22	23.0
2013		48.29	3.80	33.45	36.22	3.15	8	171	21	18.6
2014										19.4
2015										
2016										
2017										
2018										
2019										
2020										
2021										
2022										
2023										
2024										
2025										

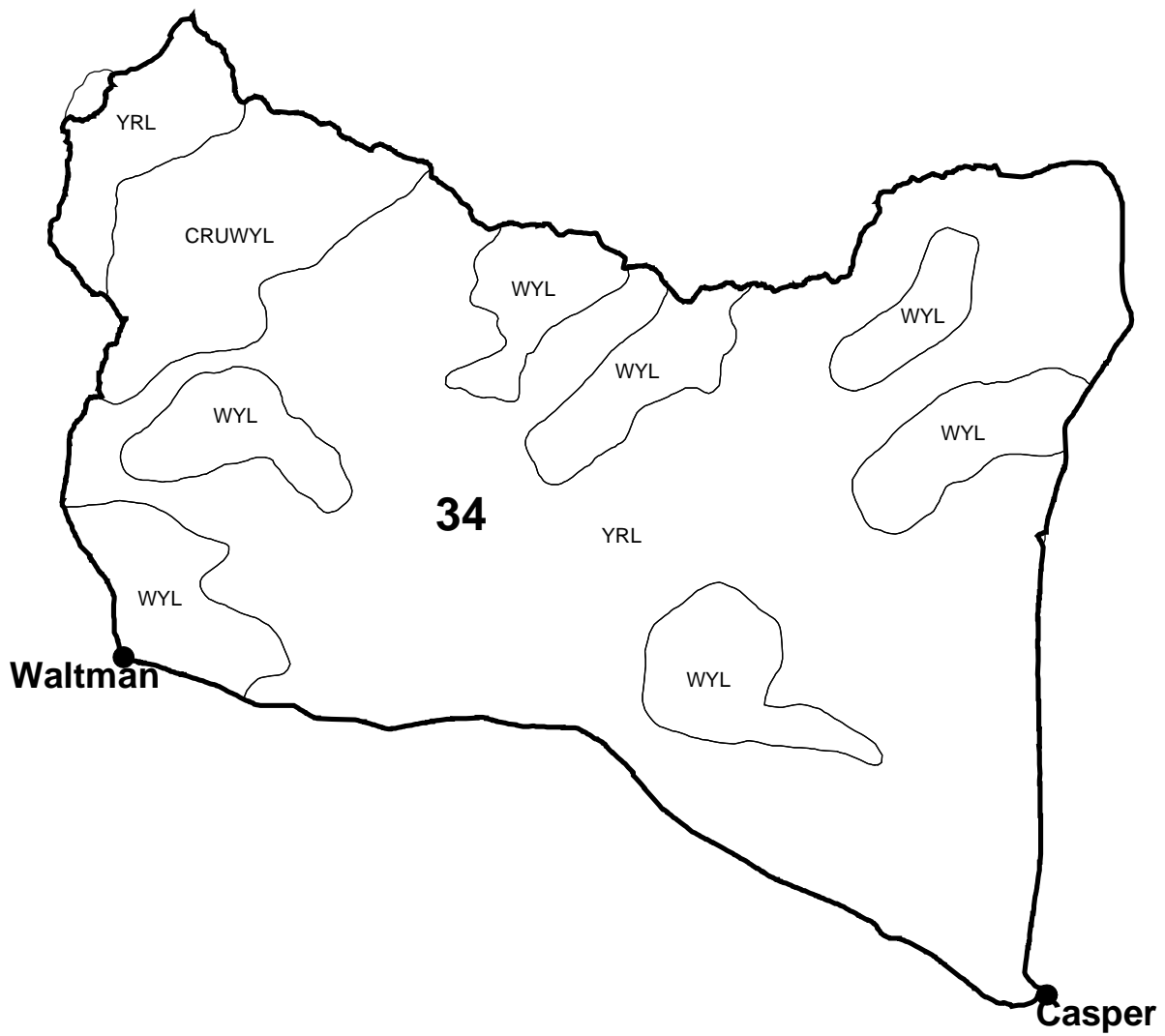
FIGURES



Comments:

END

Mule Deer - North Natrona  
Hunt Area 34  
Casper Region  
Revised 4/88





## 2012 - JCR Evaluation Form

SPECIES: White tailed Deer  
 HERD: WD706 - BLACK HILLS  
 HUNT AREAS: 1-6

PERIOD: 6/1/2012 - 5/31/2013

PREPARED BY: JOE SANDRINI

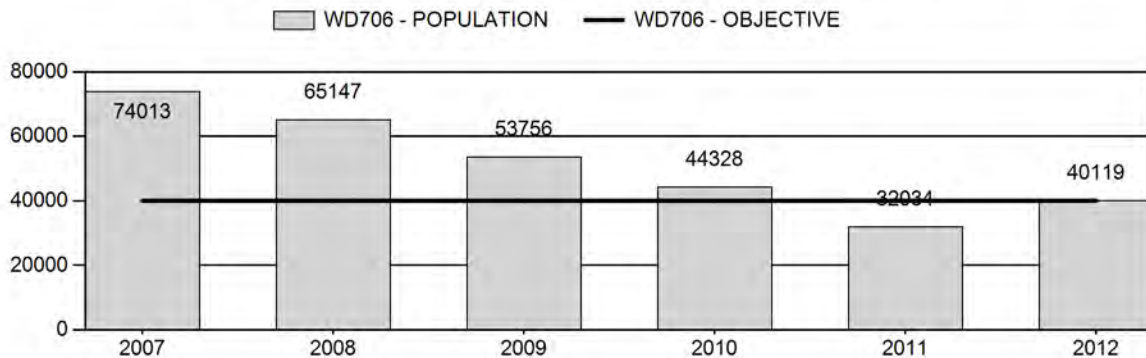
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	53,856	40,119	48,946
Harvest:	5,303	3,429	3,421
Hunters:	9,056	6,295	6,296
Hunter Success:	59%	54%	54%
Active Licenses:	9,474	6,638	6,624
Active License Percent:	56%	52%	52%
Recreation Days:	37,754	26,664	26,620
Days Per Animal:	7.1	7.8	7.8
Males per 100 Females	26	26	
Juveniles per 100 Females	66	73	

Population Objective: 40,000  
 Management Strategy: Recreational  
 Percent population is above (+) or below (-) objective: 0%  
 Number of years population has been + or - objective in recent trend: 1  
 Model Date: 04/09/2013

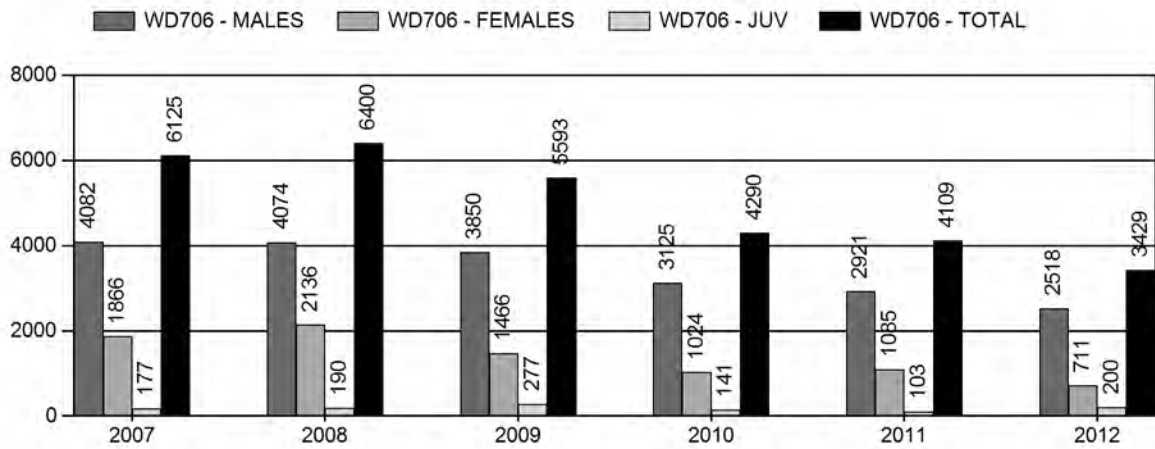
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq$ 1 year old:	3.6%	3.0%
Males $\geq$ 1 year old:	36.7%	26.4%
Juveniles (< 1 year old):	1.5%	1.4%
Total:	8.6%	7.1%
Proposed change in post-season population:	-27.7%	+25.3%

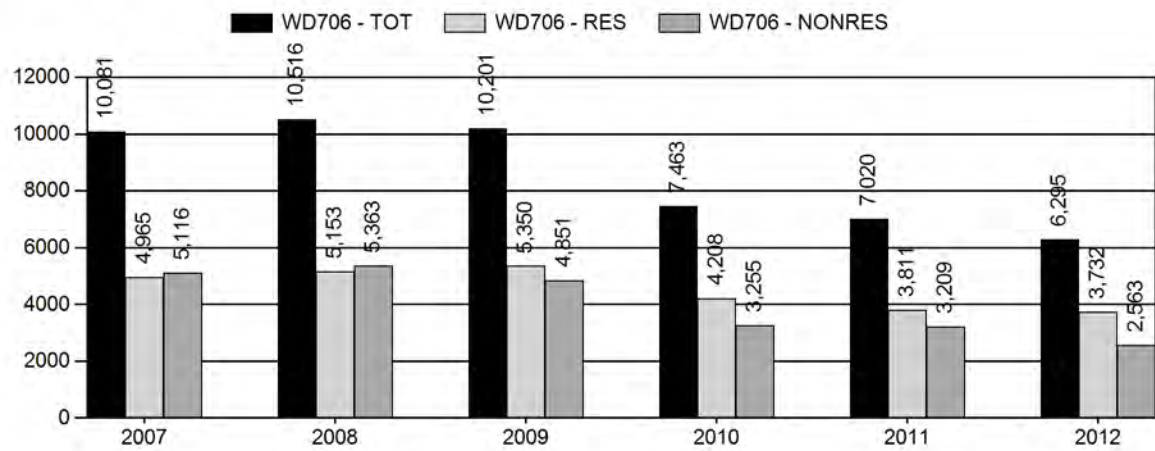
## Population Size - Postseason



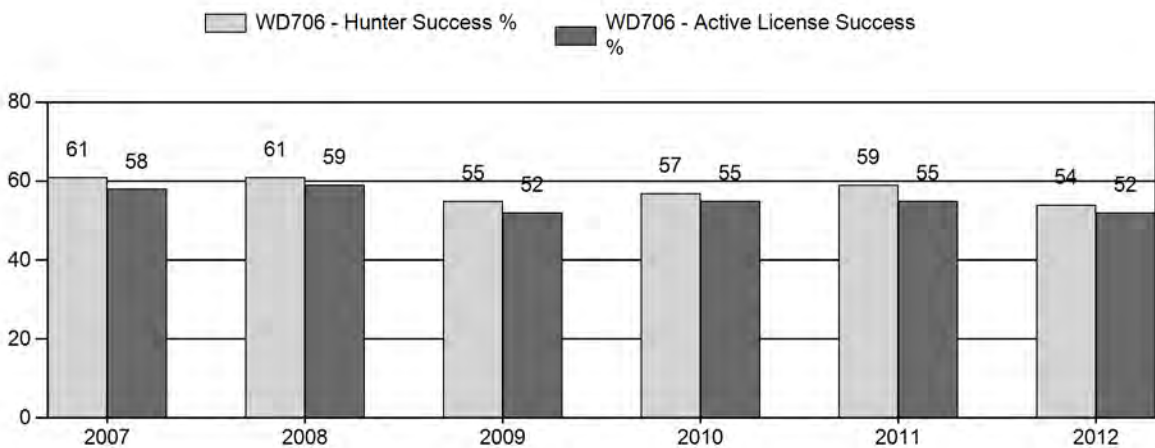
# Harvest



# Number of Hunters

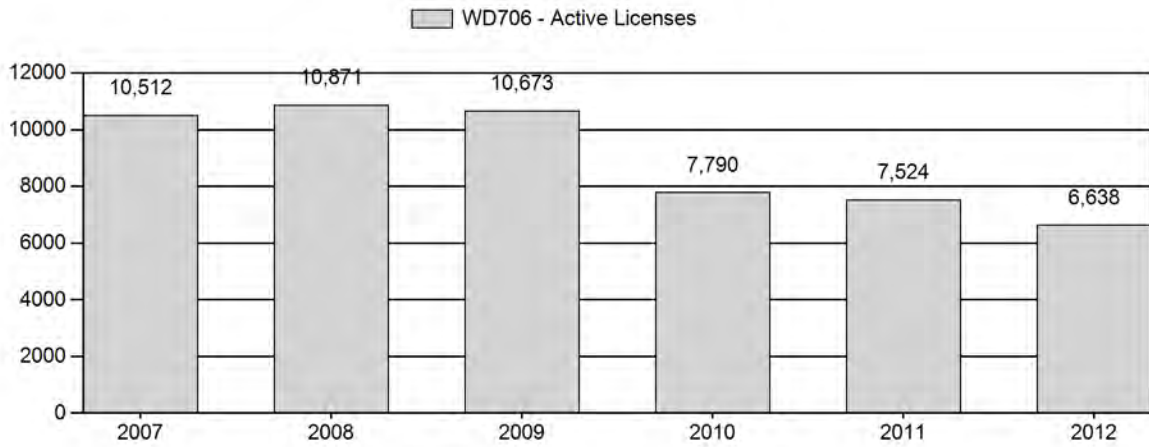


# Harvest Success

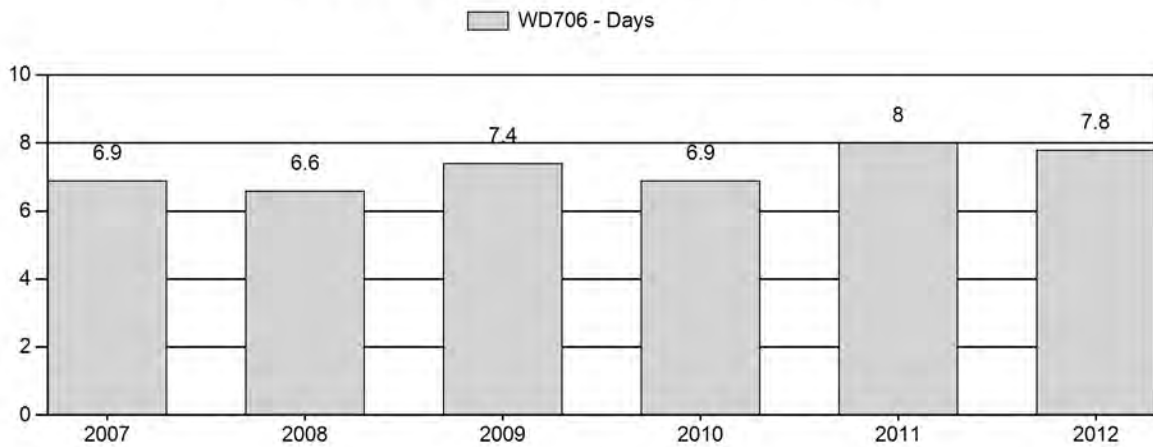




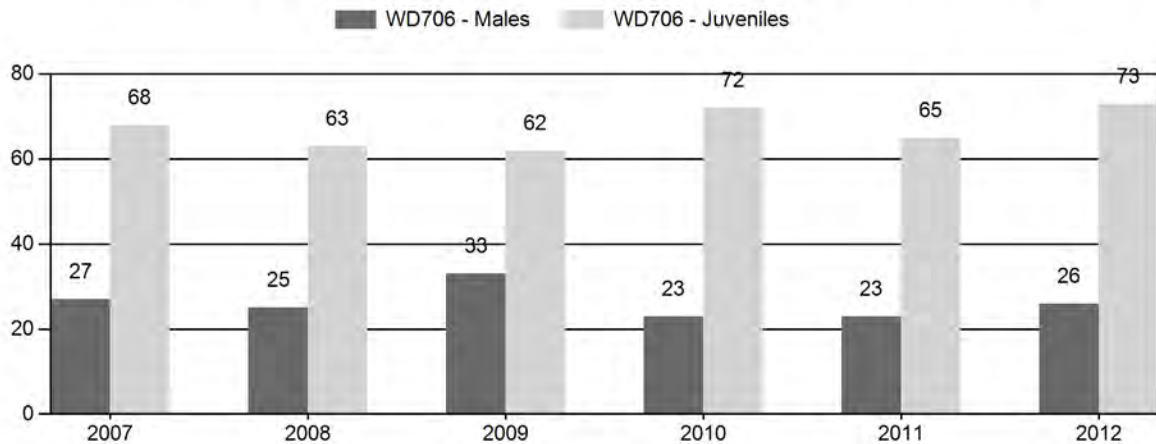
## Active Licenses



## Days Per Animal Harvested



## Preseason Animals per 100 Females



## 2007 - 2012 Preseason Classification Summary

for White tailed Deer Herd WD706 - BLACK HILLS

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	80,751	145	190	335	14%	1,238	51%	843	35%	2,416	1,439	12	15	27	± 2	68	± 4	54
2008	72,187	127	222	349	13%	1,381	53%	871	33%	2,601	1,247	9	16	25	± 0	63	± 0	50
2009	59,908	131	224	355	17%	1,079	51%	672	32%	2,106	1,260	12	21	33	± 0	62	± 0	47
2010	49,047	93	232	325	12%	1,407	51%	1,016	37%	2,748	1,536	7	16	23	± 0	72	± 0	59
2011	36,554	48	149	197	12%	856	53%	559	35%	1,612	1,278	6	17	23	± 0	65	± 0	53
2012	43,891	93	143	236	13%	919	50%	675	37%	1,830	1,590	10	16	26	± 0	73	± 0	58

**2013 HUNTING SEASONS**  
**BLACK HILLS WHITE-TAILED DEER HERD (MD751)**

<b>Hunt Area</b>	<b>Type</b>	<b>Season Dates</b>		<b>Quota</b>	<b>Limitations</b>
<b>Opens</b>	<b>Closes</b>				
1		Nov. 1	Nov. 22		General license; antlered deer off private land; any deer on private land
1, 2, 3	6	Nov. 1	Nov. 22	25	Limited quota licenses; doe or fawn valid on private land
1,2	8	Nov. 1	Nov. 22	800	Limited quota licenses; doe or fawn white-tailed deer valid on private land
2		Nov. 1	Nov. 22		General license; antlered deer off private land; any deer on private land
3		Nov. 1	Nov. 22		General license; antlered deer off private land; any deer on private land
4		Nov. 1	Nov. 20		General license; antlered deer off private land; any deer on private land except the lands of the State of Wyoming's Ranch A property shall be closed
4	6	Nov. 1	Nov. 20	150	Limited quota licenses; doe or fawn valid on private land
5		Nov. 1	Nov. 20		General license, antlered deer off private land; any deer on private land
	6	Nov. 1	Nov. 20	25	Limited quota licenses; doe or fawn
6		Nov. 1	Nov. 20		General license; antlered deer off private land; any deer on private land
6, 9	6	Nov. 1	Nov. 20	25	Limited quota licenses; doe or fawn valid in those portions of Area 6 and Area 9 east of U.S. Highway 85
Archery		Sept. 1	Sept. 30		Refer to license type and limitations in Section 3

**Region A Nonresident Quota: 2,750**

Hunt Area	License Type	Quota change from 2012
Herd Unit Totals	All	None
	Region A	None

### **Management Evaluation**

**Current Management Objective:** 40,000

**Management Strategy:** Recreational

**2012 Postseason Population Estimate:** ~ 40,100

**2013 Proposed Postseason Population Estimate:** ~ 49,000

**HERD UNIT ISSUES:** The management objective of the Black Hills White-Tailed Deer Herd Unit is an estimated post-season population of 40,000 deer. This herd is managed under the recreational management strategy. The population objective and management strategy were set in 1983. The objective and management strategy are scheduled for review during bio-year 2014.

The Black Hills White-Tailed Deer Herd unit is located within Crook and Weston Counties in northeastern Wyoming and encompasses 3,138 mi<sup>2</sup>, of which 3,132 mi<sup>2</sup> are considered occupied habitat. Seasonal range maps for this herd were updated in 2004, and currently 335 mi<sup>2</sup> are delineated as crucial winter range. Seventy-nine percent of the land in this herd unit is privately owned. The largest blocks of accessible public land are found on the Black Hills National Forest in Hunt Areas 2 and 4, Thunder Basin National Grassland in Hunt Area 6, and BLM lands in Hunt Area 1. Access fees for hunting are common on private land, and many holdings have been leased to outfitters. Consequently, accessible public lands are subject to heavy hunting pressure. Due to limited access for hunters on private land, keeping the growth of this herd in check is difficult when habitat and weather conditions are favorable.

Whitetails are the most numerous deer species in Hunt Areas 2 and 4, whereas more equal proportions or greater numbers of mule deer occupy Hunt Areas 1, 3, 5, and 6 depending upon habitat type. A high proportion of white-tailed deer in the herd unit reside on private land. This results in their management being strongly influenced by landowner tolerance. Field personnel report white-tailed deer numbers are now well below local tolerance, and most landowners and the hunting public desire to see more deer.

Dominant land uses in the herd unit include agricultural grazing and forage crop production. Most forested lands are actively managed for timber production and harvest. There is some extraction of minerals, primarily bentonite and oil. The majority of white-tailed deer are found in the eastern two-thirds of this herd unit and along the Belle Fourche River drainage where habitat is favorable.

Modeling of this population has been difficult due to substantial interstate movement of deer, regular outbreaks of epizootic hemorrhagic disease (EHD), and very low productivity compared to other white-tailed deer herds. Consequently, population estimates produced by the model should be viewed cautiously. Because of this, and the fact that much of the herd unit is

comprised of private property, management of this herd has been based heavily on perceptions of deer numbers relative to landowner tolerance.

**WEATHER:** Drought conditions, which were persistent throughout the Black Hills between 2000 and 2007, began to moderate in 2008. Between 2008 and 2012, annual temperatures were below the previous 30-year average and annual precipitation each year above the previous 30-year average; and 2010 was significantly colder and wetter than both the 30-year and 100-year averages (<http://lwf.ncdc.noaa.gov/temp-and-precip/time-series>). The predominant weather pattern was characterized by generally cool summers, more persistent snow cover in late fall and winter, and above normal spring moisture. Notably, the winter of 2010-11 saw periods of extended low temperatures and persistent, deep snow cover rivaled only five times previous since the late 1890's. This tough winter preceded bio-year 2012, which was one of the driest on record. Warm and dry conditions beset the area in April of 2012, and continued through the 2012-13 winter. April of 2013 finally saw a break in this pattern when temperatures dropped below normal for the entire month and significant precipitation was again received (<http://www.ncdc.noaa.gov/temp-and-precip/>). Overall, the weather pattern during bio-year 2012 resulted in poor forage production and led to several large wildfires in the southern half of the herd unit. This recent weather pattern resulted in slightly below average recruitment, and average over-winter survival of all age classes of white-tailed deer.

**HABITAT:** Ponderosa pine (*Pinus ponderosa*) is the dominant overstory species on forested lands. Quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), and bur oak (*Quercus macrocarpa*) stands are also present. Many areas dominated by deciduous trees are in late successional stages. Important shrubs include Saskatoon serviceberry (*Amelanchier alnifolia*), Oregon grape (*Berberis repens*), common chokecherry (*Prunus virginiana*), and spiraea (*Spiraea betulifolia*). Non-timbered lands in this portion of the herd unit are used to produce agricultural crops such as winter wheat (*Triticum aestivum*), alfalfa hay (*Medicago sativa*), or mixed-grass hay. White-tailed deer in the western one-third of the Black Hills herd unit are limited mainly to riparian habitats and associated agricultural ground. Outside of these riparian corridors habitat in this portion of the herd unit is dominated by sagebrush steppe and grasslands with scattered ponderosa pine covered hills.

Winter forage production and use are measured along two bur oak monitoring transects on the Black Hills National Forest (BHNF). These transects reveal very consistent, annual mean leader growth between 2003 and 2009 (no production data have been collected since). Annual leader growth averaged about two inches, with a standard deviation of less than one-half of an inch. The lowest production occurred between 2003 and 2005 and the greatest in 2009. It appears for some reason bur oak may invest extra water resources in either leader growth or mast production. This may be a function of timing of precipitation events, and complicates year to year comparisons of production data along with applying these data to deer management recommendations. Utilization of bur oak leaders available to deer has averaged 59% (std. dev. 9%). This level of use is considered excessive, since it regularly exceeds 50%. Interestingly, body condition of hunter harvested whitetails has not been well correlated with bur oak leader growth, contradicting assumptions body condition would be reduced without good leader growth. Obviously, other food sources in the summer are contributing more to fall body condition than bur oak, as this browse species is more of a winter food, and body condition in the fall is influenced more by grass and forb production.

**FIELD DATA:** Preseason age and sex classifications are conducted in this Herd Unit the second half of October along standardized routes. Most of these routes have been used for over 40 years. During the past three decades, fawn production and survival, based upon preseason classification counts, has been well below most white-tailed deer herds, and at times fluctuated dramatically. The underlying cause is thought to be related to over-winter nutritional condition of does (pers. Comm. SDGF&P). Over the past decade, observed fawn:doe ratios have improved, likely a result of vegetative responses to fire. Since 2002, observed fawn:doe ratios exhibited a general trend upwards, improving about 10%. Preseason buck:doe ratios have been more stable. Since 2002, observed preseason buck:doe ratios have exhibited a mean of 27:100 (std. dev = 4). As such, this herd's preseason buck:doe ratios are generally at the lower end of the Department's recreational management criteria. However, it should be noted that classifications are made outside the rut, and because whitetails are secretive, we have always modeled this herd's preseason buck:doe ratio about 30% above observed values. This has been necessary to create functional models, and seems reasonable given the classification protocol.

Fall body condition data have been collected from harvested white-tailed deer since 1997, although most of the data are from bucks. A chi-square analysis of these data revealed white-tailed deer had fall fat stores in line with expected values in 2004 & 2005, and more deer than expected were in excellent shape in 2006. The next year body condition began to drop. Body condition indices (BCI scores) then declined significantly in 2008, with more deer than expected exhibiting poor or fair body condition. In 2009, as the population decline continued, BCI scores improved, and they were not significantly different from expected values. The story in 2010 and 2011 was similar, with most deer being in fair to good shape. These data were not collected in 2012, but field checks of harvested deer suggest body condition dropped with the onset of extreme drought. One can infer that when the population peaked in 2007, the number of deer on the ground exceeded what the habitat could support, especially in the face of the more normal to severe winter and spring weather that followed. But, as the population declined, deer numbers became more congruent with forage availability.

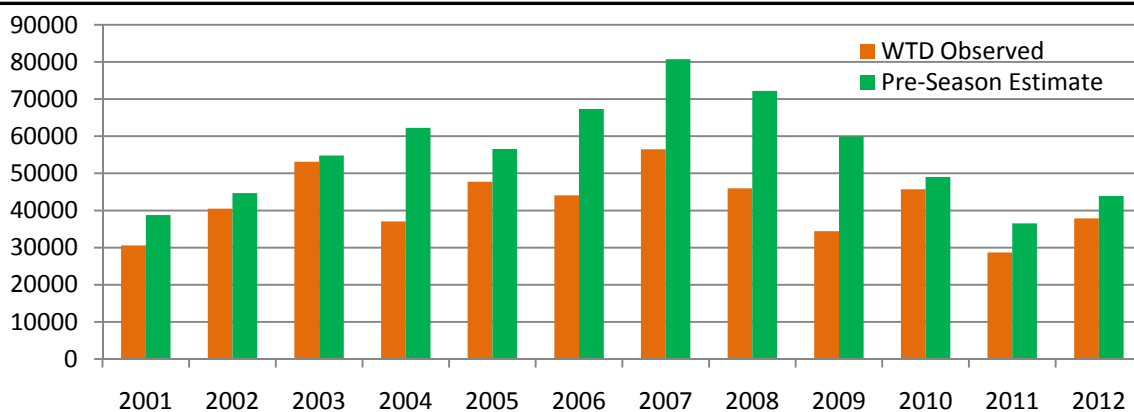
**HARVEST DATA:** In the Black Hills, deer management entails regulating both mule deer and whitetail harvest under a single season structure, across a variety of habitats and habitat conditions, with serious deference given to landowner desires. An analysis of harvest information suggests hunter numbers has the greatest impact on harvest. As such, buck harvest has been regulated by altering non-resident hunter numbers via changes in the Region A quota, while resident buck hunter participation can only be limited by shortening the season – notably by inclusion or removal of the Thanksgiving Day weekend and the days following in November. With more conservative hunting season structures in place since 2010, harvest has dropped. At the same time, hunter success has generally declined and effort increased.

Hunting seasons the past three years reduced harvest of whitetail bucks 29% from that experienced during the traditional 30-day November season the preceding three years. Comparing these same time periods, resident harvest of white-tailed bucks dropped 16%, while non-resident harvest of white-tailed bucks dropped 39%. During this time, harvest of mule deer bucks declined more precipitously (see MD751). Despite these trends, hunter satisfaction essentially remained unchanged for both species the past two years, with about 67% of the hunters reporting they were either satisfied or very satisfied with their Black Hills deer hunt, and 18% reporting they were either dissatisfied or very dissatisfied – regardless of species.

**POPULATION:** Population modeling of this herd has been difficult and fraught with problems. The population violates the closed population assumption due to significant interstate movement of deer between Wyoming, Montana, and South Dakota. In addition, fluctuations in observed fawn:doe ratios, outbreaks of EHD, increased predation, a high level of vehicle-deer collisions, the low productivity of this herd, and reduced visibility of bucks during classifications make use of classification data tenuous for constructing a population model. However, the Semi-Constant Juvenile / Semi-Constant Adult Survival (SJA SCA) model selected to estimate the population is about 80% correlated with preseason trend counts since 1996, and approximately 60% correlated with trend counts the past five years (Figure 1). Because this model was best correlated with trend count data, it was selected over the Time Sensitive Juvenile / Constant Adult Survival model (TSJ CA), although the latter exhibited a lower AICc value (184 vs. 291) and better fit observed buck:doe ratios (76 vs. 218). The TSJ CA model was also rejected because it constrained juvenile survival rates to set limits 13 out of 20 years. Changes in the preseason population estimates produced by the SJA SCA model were inversely correlated 60% with changes in hunter effort, while the TSJ CA model exhibited a slight positive correlation. With regards to changes in hunter success, none of the models correlate well with harvest statistics, but the SJA SCA model does the best job. Based upon the above listed criteria, we consider this model to be of poor quality, but better than the competing models.

The spreadsheet model suggests recent postseason populations have been very close to our current management objective of 40,000 white-tailed deer, rather than the approximately 29,000 projected by POP-II the past couple of years. If population estimates produced by the spreadsheet model are close to accurate, then our current objective is well below landowner desires. At this time, the majority of landowners have expressed dissatisfaction with the low number of deer. Based upon normal habitat conditions and these desires, a season designed to increase this herd is warranted.

Based on the spreadsheet model, this population grew 115% between 2001 and 2007. The population then declined 57% to its recent nadir in 2011, before rebounding 25% in 2012. The trends produced with the spreadsheet model are similar to those produced prior using POP-II. However, the projected spreadsheet fluctuations are larger and not as highly correlated with preseason trend count data (68%) compared to the POP-II model.



**Figure 1. 2011-2012 white-tailed deer, estimated preseason population and trend count data, increased by a factor of 10.**

Beginning in 2002, hunting seasons were structured to retard growth. Population growth was reversed in 2007, but this directional change was primarily due to increased non-hunting mortality rather than enhanced harvest. Changes in survival rates have been most ostensibly attributed to increased over-winter mortality caused by late spring blizzards in 2008 & 2009, and an unusually severe winter in bio-year 2010. These weather events combined with epizootic hemorrhagic disease (EHD) outbreaks each of the past five years to increase annual mortality in all sex and age classes of deer. Between 2007 and 2010, evidence also suggests the mountain lion population in the Black Hills reached historically high levels. As a result, elevated harvest, weather conditions, disease, and increased predation acted in concert to reduce this population substantially. In response, hunting seasons have been conservative since 2010.

**MANAGEMENT SUMMARY:** There are no changes are being implemented for the 2013 white-tailed deer hunting season in the Black Hills. Retention of the November 22<sup>nd</sup> closing date in Hunt Areas 1, 2, & 3 will maintain three full weekends of deer hunting. Retaining the Thanksgiving Day closing date would add another full week and weekend of hunting to the season beyond what has been in place the past three years. Hunter and landowner dissatisfaction with overall buck numbers warrants the continuation of a season structure similar to what has been in place. Adding any hunting pressure during the peak of the rut would substantially increase buck harvest – especially harvest of mule deer bucks. Continuing with a Region A license quota identical to last year is also intended to limit harvest of bucks of both species. The 2013 Black Hills deer hunting season is expected to yield a 2013 postseason population of about 49,000 white-tailed deer, which represents a 22% increase in the current post-season population. But, it will also result in a slight decline in the sympatric mule deer herd. This proposed hunting season is reasonable given the balance we must achieve between managing the area's two deer herds, habitat conditions, damage complaints, and the current demographic status of the white-tailed deer herd.



INPUT

Species:

White-Tail Deer

Biologist:

Sandrine

Herd Unit & No.:

Black Hills

Model date:

02/20/13

☒ Clear form

MODELS SUMMARY				
	Fit	Relative AICc	Check best model to create report	
CJ/CA	975413	975422	<input type="checkbox"/> CJ/CA Model	Notes
SCJ/SCA	218	291	<input type="checkbox"/> SCJ/SCA	
TSJ/CA	76	184	<input type="checkbox"/> TSJ/CA Model	

Population Estimates from Top Model																
Year	Pre-Rifle Pop Est		Trend Count	Pre-Archery Season Population (year i)			Pre-Rifle Season Population (year i)			Predicted Posthunt Population (year i)			Objective			
	Field Est	Field SE		Juveniles	Total Males	Females	Total	Juveniles	Total Males	Females	Total	Juveniles		Total Males	Females	Total
1993				11298	5968	17479	34745	11298	5968	17479	34745	10583	2237	13897	26717	40000
1994				11107	6147	17232	34486	11107	6147	17232	34486	11012	3096	16680	30788	40000
1995				9284	6308	17675	33268	9284	6308	17675	33268	9205	3644	17044	29893	40000
1996	22250			8611	6095	17222	31928	8611	6095	17222	31928	8569	3769	16862	29200	40000
1997	19300			6427	6924	19461	32811	6427	6924	19461	32811	6403	4350	18982	29734	40000
1998	31580			11146	6589	20595	38329	11146	6589	20595	38329	11104	4290	20238	35632	40000
1999	41940			14974	8955	24203	48132	14974	8955	24203	48132	14940	7369	23973	46282	40000
2000	42560			14774	12956	28798	56528	14774	12956	28798	56528	14707	9270	28169	52146	40000
2001	30610			6527	9043	23189	38760	6527	9043	23189	38760	6414	5893	22307	34414	40000
2002	40500			13121	7822	23729	44673	13121	7822	23729	44673	13048	4402	23234	40684	40000
2003	53140			18217	9278	27315	54809	18217	9278	27315	54809	17985	5196	26317	49497	40000
2004	37050			18075	11979	32198	62251	18075	11979	32198	62251	17920	8091	31163	57174	40000
2005	47730			17282	10137	29164	56583	17282	10137	29164	56583	17089	5969	27749	50806	40000
2006	44080			21799	12350	33179	67328	21799	12350	33179	67328	21549	8026	31438	61013	40000
2007	56470			26192	16095	38465	80751	26192	16095	38465	80751	25997	11604	36412	74013	40000
2008	45970			22182	14836	35170	72187	22182	14836	35170	72187	21973	10355	32820	65147	40000
2009	34410			18353	12087	29469	59908	18353	12087	29469	59908	18048	7852	27856	53756	40000
2010	45710			16934	8661	23451	49047	16934	8661	23451	49047	16779	5224	22325	44328	40000
2011	28700			11933	6348	18273	36554	11933	6348	18273	36554	11820	3135	17079	32034	40000
2012	37850			15375	7584	20932	43891	15375	7584	20932	43891	15155	4815	20150	40119	40000
2013				16962	10540	25208	52709	16962	10540	25208	52709	16732	7760	24454	48946	40000
2014																40000
2015																40000
2016																40000
2017																40000
2018																40000
2019																40000
2020																40000
2021																40000
2022																40000
2023																40000
2024																40000
2025																40000

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates		
	Model Est	Field Est	Model Est	Field Est	SE
1993	0.81		0.95		
1994	0.81		0.80		
1995	0.81		0.80		
1996	0.81		0.95		
1997	0.81		0.95		
1998	0.90		0.95		
1999	0.81		0.95		
2000	0.50		0.70		
2001	0.81		0.95		
2002	0.81		0.95		
2003	0.81		0.95		
2004	0.50		0.80		
2005	0.81		0.95		
2006	0.81		0.95		
2007	0.50		0.80		
2008	0.50		0.75		
2009	0.50		0.70		
2010	0.50		0.65		
2011	0.81		0.95		
2012	0.81		0.95		
2013	0.81		0.95		
2014					
2015					
2016					
2017					
2018					
2019					
2020					
2021					
2022					
2023					
2024					
2025					

Parameters:		Optim cells
Juvenile Survival =		0.808
Adult Survival =		0.950
Initial Total Male Pop/10,000 =		0.597
Initial Female Pop/10,000 =		1.748

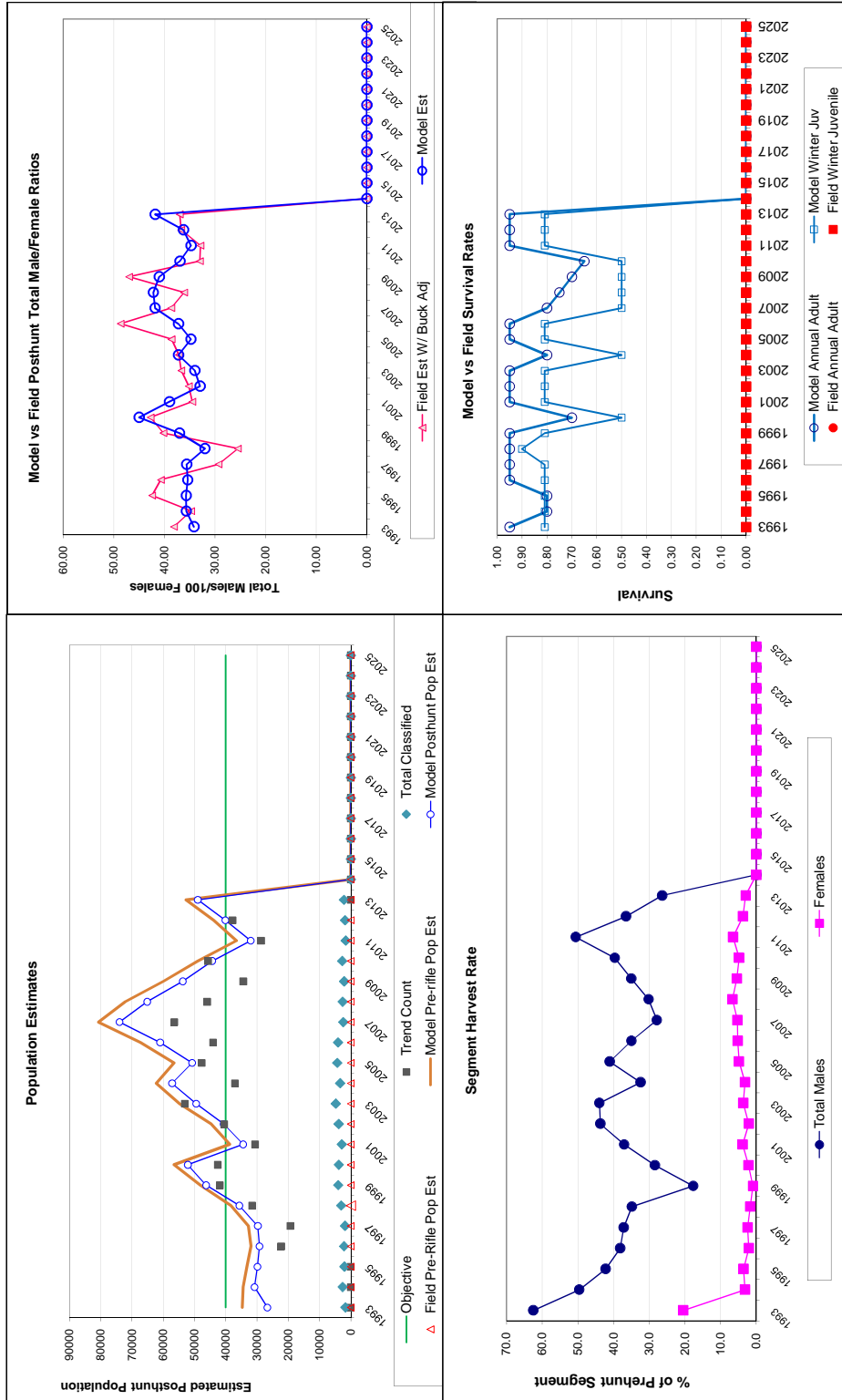
MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Buck Adjustment Factor	70%

Parameters:		Optim cells
Juvenile Survival =		0.808
Adult Survival =		0.950
Initial Total Male Pop/10,000 =		0.597
Initial Female Pop/10,000 =		1.748

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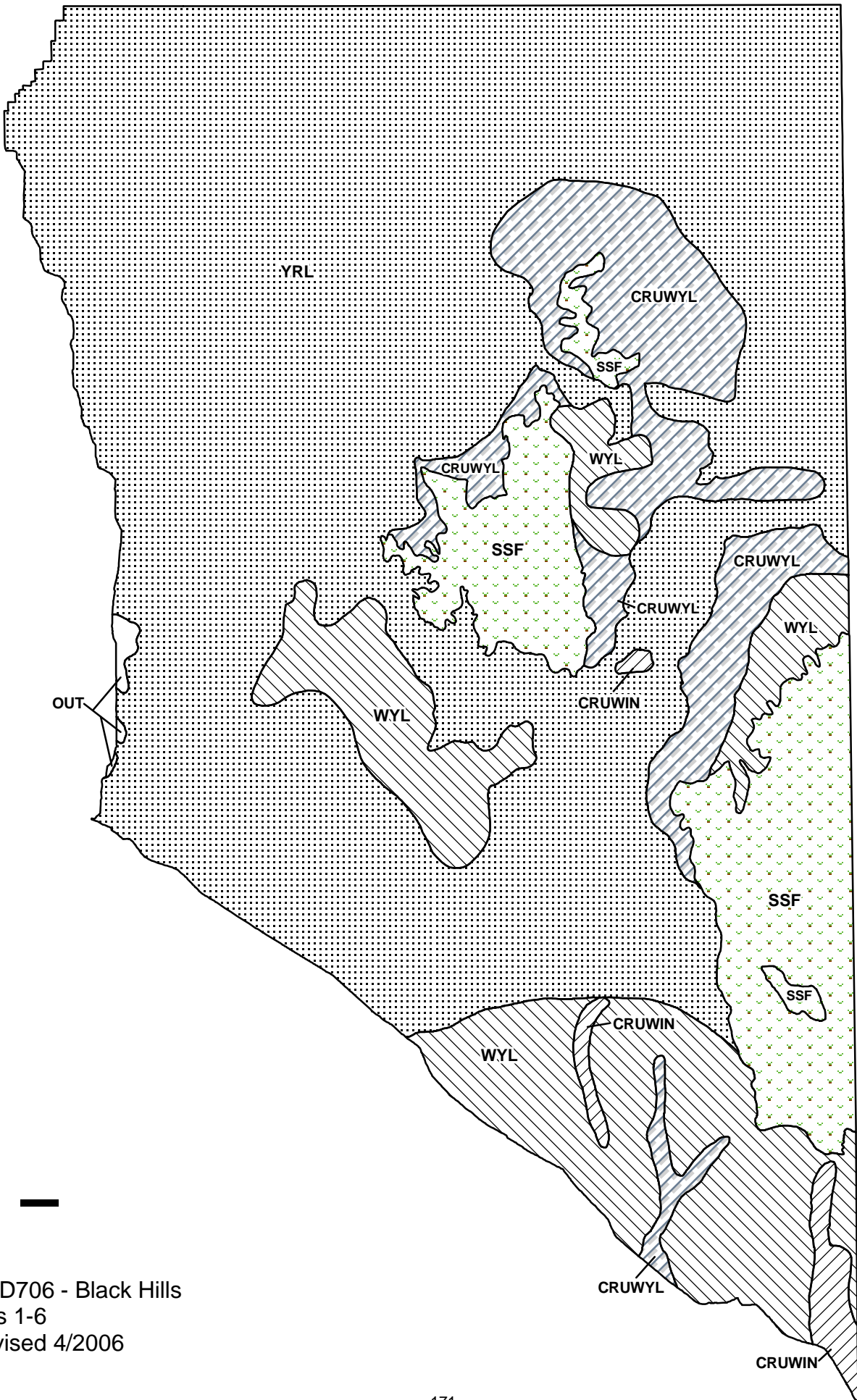
Classification Counts										Total Harvest (Rifle+Archery)			
Year	Juvenile/Female Ratio			Total Male/Female Ratio			Juv	Males	Females	Total Harvest	Segment Harvest Rate (% of		
	Derived Est	Field Est	Field SE	Derived Est	Field est w/ buck Adj	Field SE					Total Males	Females	
1993		64.64	3.46	34.14	38.13	1.95	650	3392	3256	7298	62.5	20.5	
1994		64.45	2.78	35.67	34.72	1.49	86	2774	502	3362	49.6	3.2	
1995		52.53	2.69	35.69	42.42	1.86	72	2422	574	3068	42.2	3.6	
1996		50.00	2.49	35.39	40.68	1.74	38	2115	327	2480	38.2	2.1	
1997		33.03	1.92	35.58	29.29	1.44	22	2340	435	2797	37.2	2.5	
1998		54.12	2.17	31.99	25.48	1.09	38	2090	324	2452	34.9	1.7	
1999		61.87	2.18	37.00	40.20	1.31	31	1442	209	1682	17.7	0.9	
2000		51.30	1.92	44.99	42.73	1.36	61	3351	572	3984	28.5	2.2	
2001		28.15	1.38	39.00	34.47	1.26	103	3046	802	3951	37.1	3.8	
2002		55.30	2.00	32.96	35.20	1.20	67	3109	450	3626	43.7	2.1	
2003		66.69	2.12	33.97	36.65	1.14	211	3711	907	4829	44.0	3.7	
2004		56.14	2.17	37.20	37.14	1.33	141	3534	941	4616	32.5	3.2	
2005		59.26	2.02	34.76	38.60	1.22	176	3789	1287	5252	41.1	4.9	
2006		65.70	2.31	37.22	48.65	1.50	227	3931	1583	5741	35.0	5.2	
2007		68.09	3.04	41.84	38.66	1.67	177	4082	1866	6125	27.9	5.3	
2008		63.07	2.73	42.18	36.10	1.51	190	4074	2136	6400	30.2	6.7	
2009		62.28	3.06	41.02	47.00	2.01	277	3850	1466	5593	35.0	5.5	
2010		72.21	2.97	36.93	33.00	1.42	141	3125	1024	4290	39.7	4.8	
2011		65.30	3.55	34.74	32.88	1.82	103	2921	1085	4109	50.6	6.5	
2012		73.45	3.72	36.23	36.69	1.87	200	2518	711	3429	36.5	3.7	
2013		67.29	3.16	41.81	36.98	1.70	209	2527	685	3421	26.4	3.0	
2014													
2015													
2016													
2017													
2018													
2019													
2020													
2021													
2022													
2023													
2024													
2025													

FIGURES



Comments:

END



WTD706 - Black Hills  
HAs 1-6  
Revised 4/2006



## 2012 - JCR Evaluation Form

SPECIES: White tailed Deer

PERIOD: 6/1/2012 - 5/31/2013

HERD: WD707 - CENTRAL

HUNT AREAS: 7-15, 21-22, 34, 65-67, 88-89

PREPARED BY: HEATHER  
O'BRIEN

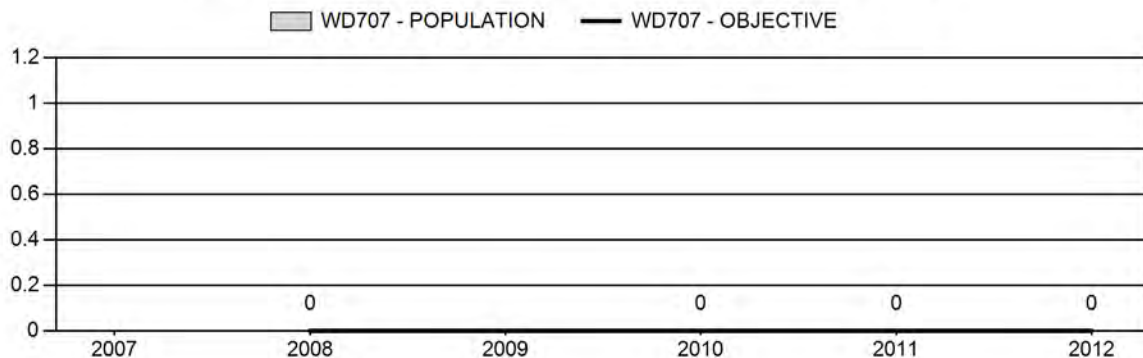
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	0	N/A	N/A
Harvest:	1,353	1,450	1,360
Hunters:	2,745	3,092	2,800
Hunter Success:	49%	47%	49 %
Active Licenses:	3,112	3,507	3,200
Active License Percent:	43%	41%	42 %
Recreation Days:	11,769	15,410	13,000
Days Per Animal:	8.7	10.6	9.6
Males per 100 Females	35	34	
Juveniles per 100 Females	66	56	

Population Objective:	0
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	N/A%
Number of years population has been + or - objective in recent trend:	0
Model Date:	None

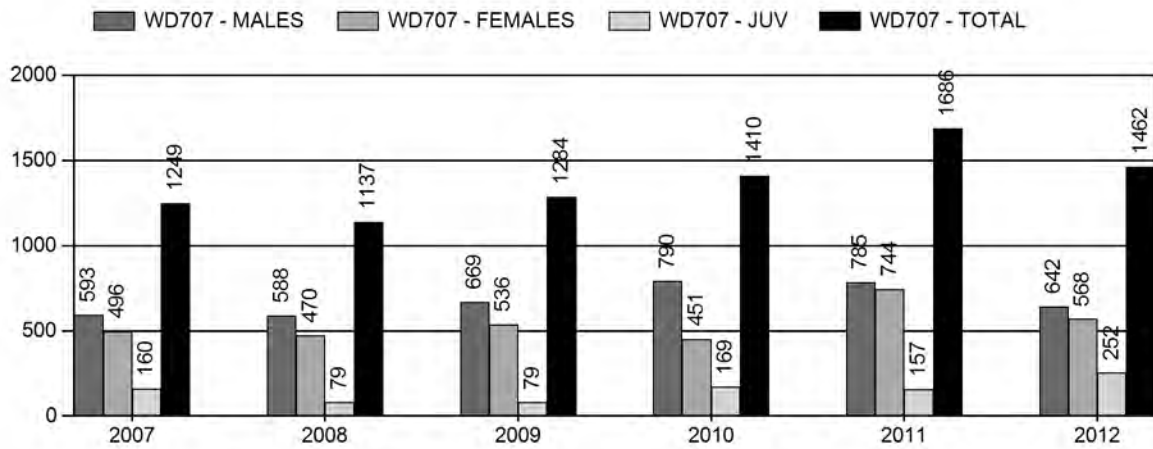
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq$ 1 year old:	0%	0%
Males $\geq$ 1 year old:	0%	0%
Juveniles (< 1 year old):	0%	0%
Total:	0%	0%
Proposed change in post-season population:	0%	0%

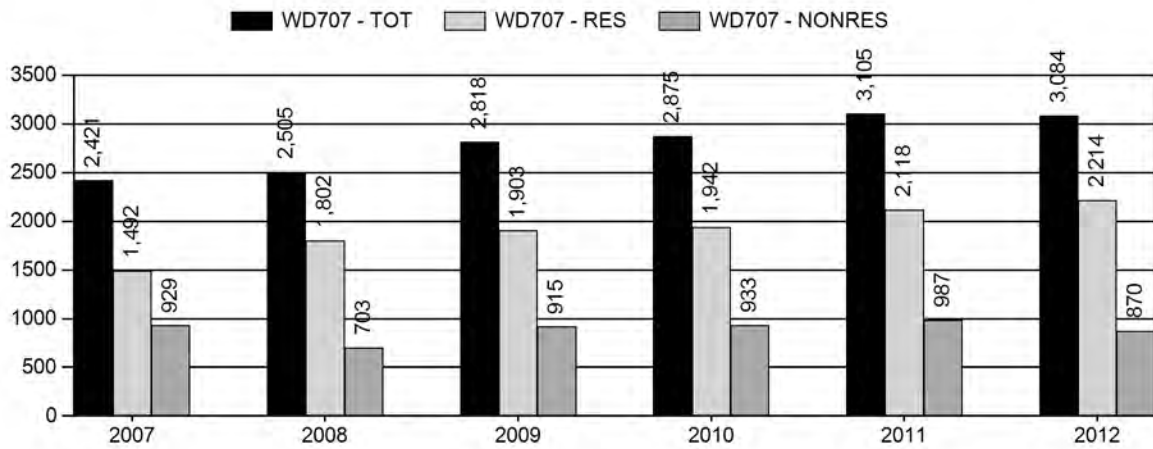
## Population Size - Postseason



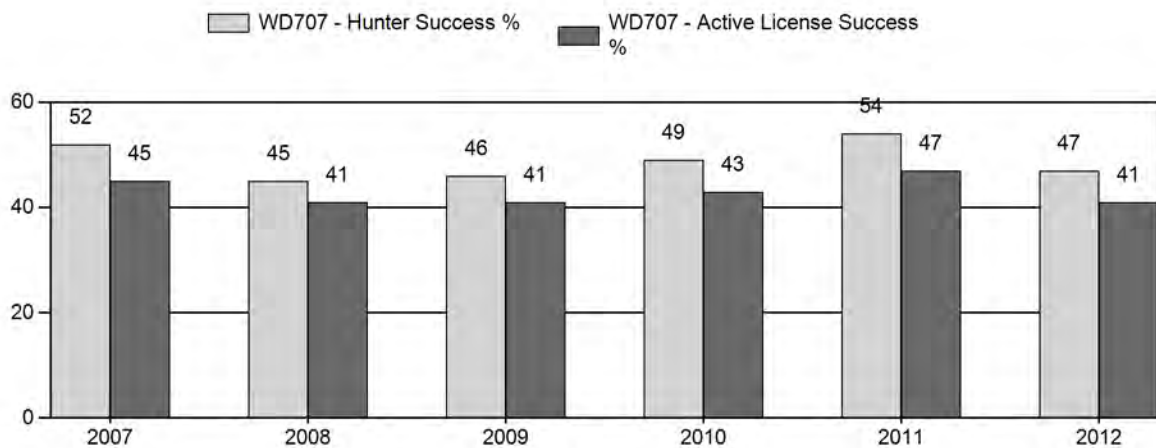
## Harvest



## Number of Hunters

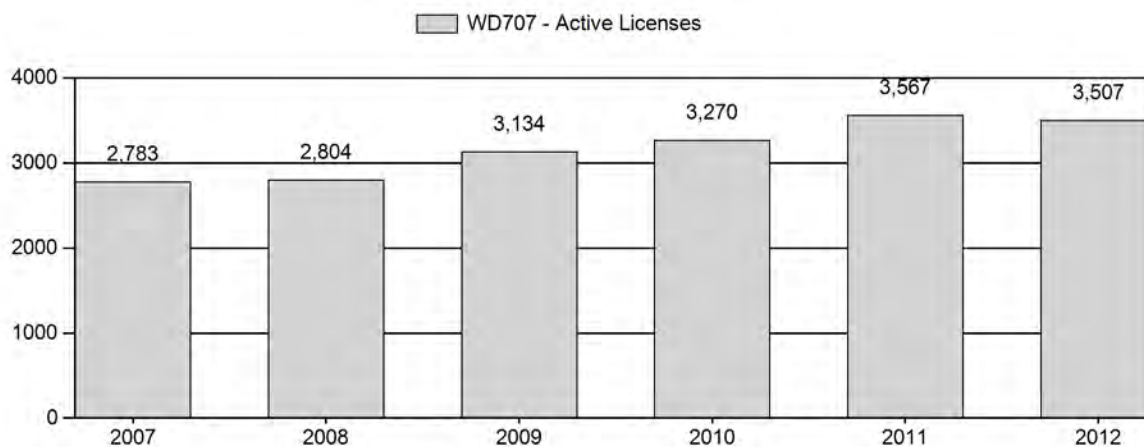


## Harvest Success

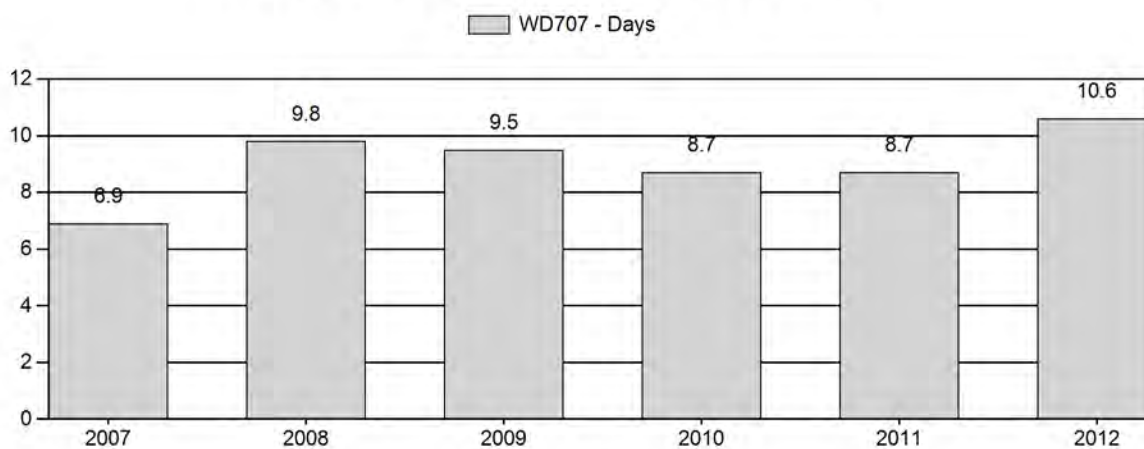




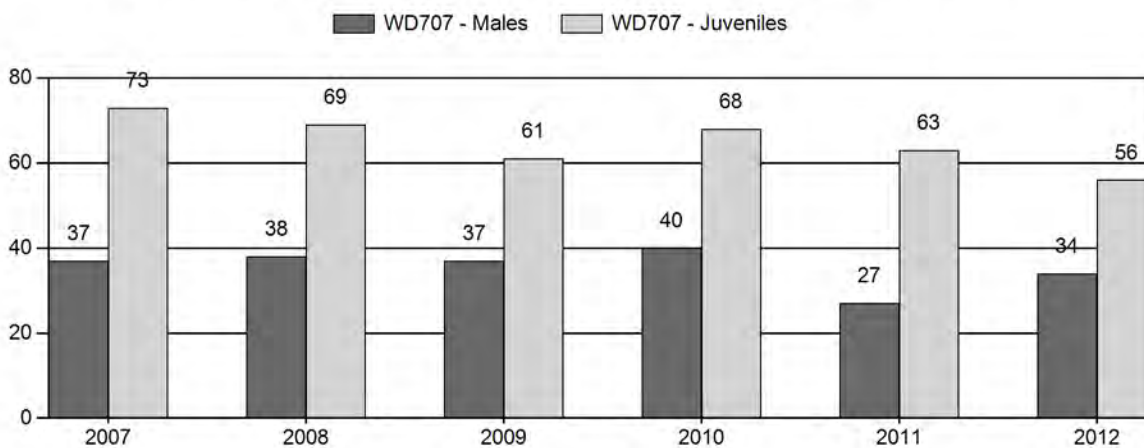
## Active Licenses



## Days per Animal Harvested



## Postseason Animals per 100 Females



## 2007 - 2012 Postseason Classification Summary

for White tailed Deer Herd WD707 - CENTRAL

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Y/g	Adult	Total	%	Total	%	Total	%			Y/g	Adult	Total	Conf	Int	100 Fem	Conf Int
2007	0	55	51	106	18%	287	48%	210	35%	603	0	19	18	37	± 0	± 0	53	
2008	0	54	91	145	18%	386	48%	266	33%	797	0	14	24	38	± 0	± 0	50	
2009	0	49	108	157	19%	430	51%	261	31%	848	0	11	25	37	± 0	± 0	44	
2010	0	60	87	147	19%	372	48%	253	33%	772	0	16	23	40	± 0	± 0	49	
2011	0	45	81	126	14%	467	53%	292	33%	885	0	10	17	27	± 0	± 0	49	
2012	0	54	76	130	18%	381	53%	212	29%	723	0	14	20	34	± 0	± 0	41	

**2013 HUNTING SEASONS**  
**CENTRAL WHITE-TAILED DEER (WD707)**

<b>Hunt Area</b>	<b>Type</b>	<b>Date of Seasons</b>		<b>Quota</b>	<b>Limitations</b>
<b>Opens</b>	<b>Closes</b>				
10,11,12 13,14,15	3	Oct. 1	Nov. 30	500	Limited quota licenses; any white-tailed deer
	8	Oct. 1	Nov. 30	500	Limited quota licenses; doe or fawn white-tailed deer
12,13,14		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
		Oct. 16	Nov. 30		General license; any white-tailed deer
22	1	Oct. 1	Oct. 14	600	Limited quota licenses; antlered mule deer or any white-tailed deer
	3	Oct. 1	Nov. 30	100	Limited quota licenses; any white-tailed deer
	6	Oct. 1	Oct. 14	100	Limited quota licenses; doe or fawn
	8	Oct. 1	Nov. 30	100	Limited quota licenses; doe or fawn white-tailed deer
34	1	Oct. 15	Oct. 31	250	Limited quota licenses; antlered deer
	3	Oct. 15	Nov. 30	50	Limited quota licenses; any white-tailed deer
	6	Oct. 15	Oct. 31	50	Limited quota licenses; doe or fawn valid on private land east of the Bucknum Road (Natrona County Road 125) within the Casper Creek drainage
	8	Oct. 15	Nov. 30	100	Limited quota licenses; doe or fawn white-tailed deer
65, 66, 88, 89	3	Oct. 15	Nov. 30	500	Limited quota licenses; any white-tailed deer
	8	Oct. 15	Nov. 30	700	Limited quota licenses; doe or fawn white-tailed deer

Note: The above season limitations are restricted to only those lines in the Chapter 6 Regulation that directly affect white-tailed deer hunting. Additional general and limited quota seasons occur in hunt areas 7-15, 22, 34, 65-67, 88, and 89 but are not captured here.

Hunt Area	Type	Quota Change
10, 11, 12, 13, 14, 15	3	0
	8	0
12, 13, 14	6	-25***
22	1	0*
	3	-100
	6	0*
	8	0
34	1	0**
	3	0
	6	0**
	8	-100
65, 66, 88	3	0
	8	0
<b>WD707 Total</b> (excluding Type 6 & 7 licenses)	<b>3</b>	<b>-100</b>
	<b>8</b>	<b>-100</b>

\*Also captured in MD755 Justification

\*\*Also captured in MD759 Justification

\*\*\*Also captured in MD759 Justification

### **Management Evaluation**

**Current Management Objective:**  $\geq 20$  bucks:100 does postseason

**2012 Postseason Population Estimate:** NA

**2013 Proposed Postseason Population Estimate:** NA

The Central White-tailed Deer Herd Unit has a postseason management objective of  $\geq 20$  bucks per 100 does. No population model exists for this herd unit. Managers are unable to obtain adequate classifications over this large herd unit due to poor sightability of white-tailed deer in cottonwood riparian habitats. Access to perform ground surveys is inconsistent and highly variable from year to year as most white-tailed deer inhabit private lands.

## **Herd Unit Issues**

White-tailed deer densities in this herd are highest along major cottonwood riparian communities of the Cheyenne River and North Platte River drainages and on irrigated hay fields in the La Prele Creek, La Bonte Creek, and Casper Creek drainages. Most white-tailed deer habitats in this herd unit are on private lands. Landowners typically have a low tolerance for white-tailed deer, and access to hunt is generally good. Periodic disease outbreaks (i.e. hemorrhagic diseases, adenovirus, Asian louse, Chronic Wasting Disease) are known to occur within this herd, and can contribute to population declines in localized areas when environmental conditions are suitable. Female harvest in this herd is typically insufficient to curtail population growth as many Type 8 licenses remain unsold. Epizootic Hemorrhagic Disease (EHD) often regulates this population given the lack of female harvest.

## **Weather**

The winter of 2011-2012 was mild with below average snow accumulations and relatively warm temperatures. The growing season of 2012 through winter of 2013 were extremely dry with above average temperatures. During the same time period, available water, forage growth, and forage quality were below average. Drought conditions seem to have had less impact on white-tailed deer compared to other big game species, as they occupy riparian habitats and irrigated agricultural areas. Still, fawn ratios of 56 per 100 does were observed during 2012 postseason classification surveys, which is lower than normal for this herd.

## **Habitat**

This herd unit has no established habitat transects that measure growth and/or utilization on shrub species that are preferred browse of white-tailed deer. Anecdotal observations from field personnel noted poor upland shrub and herbaceous forb conditions, and increased use of riparian areas by pronghorn, mule deer, and livestock. Elevated utilization along riparian corridors likely increased competition for white-tailed deer and decreased available forage during summer, fall, and winter of 2012.

## **Field Data**

Fawn ratios are typically good for this herd and range in the 60-70s per 100 does. 2012 was an exception, when observed fawn ratios were 56 per 100 does. This decrease is likely due to severe drought conditions. Browse quality and availability was reduced even along riparian corridors as moisture was low. Many landowners reported a lack of water to continue irrigation of hay fields by mid-summer. Thus, agricultural browse normally utilized by white-tailed deer was also poor in 2012. A general lack of quality forage and increased competition with other big

game species in riparian habitats likely contributed to reduced nutrition for lactating does and their fawns.

Buck ratios for the Central White-tailed Deer Herd historically average in the mid 30s per 100 does, but occasionally swell into the 40s or drop into the 20s. In 2012 the observed buck ratio was 34 per 100 does. Observed ratios may vary from year to year due to differing levels of effort or success in sampling white-tailed deer during post-season classification surveys. Buck ratios vary widely across the large variety of habitats in this herd unit as well. Additionally, white-tailed deer can be difficult to classify on private lands and in riparian cover, particularly bucks that may be solitary and elusive. Still, observed buck ratios have always met management objectives for this herd by remaining at or above 20 bucks per 100 does.

### **Harvest Data**

License success in this herd unit is typically in the 40-50<sup>th</sup> percentile, and was 56 percent in 2012. License issuance varies greatly between the many hunt areas contained within the herd unit. Hunters can typically take white-tailed deer on general licenses and also purchase additional limited quota licenses valid for any white-tailed deer or doe/fawn white-tailed deer. Issuance of limited quota licenses is managed from year to year depending on perceived numbers of white-tailed deer on private lands. Potential damage issues and willingness of landowners to provide access are also factors influencing license issuance. Access to white-tailed deer hunting opportunity generally increased and peaked in 2011 with a total of over 3,100 hunters. Since then license issuance has been reduced slightly, as the population – and hunting access – decreased somewhat.

### **Population**

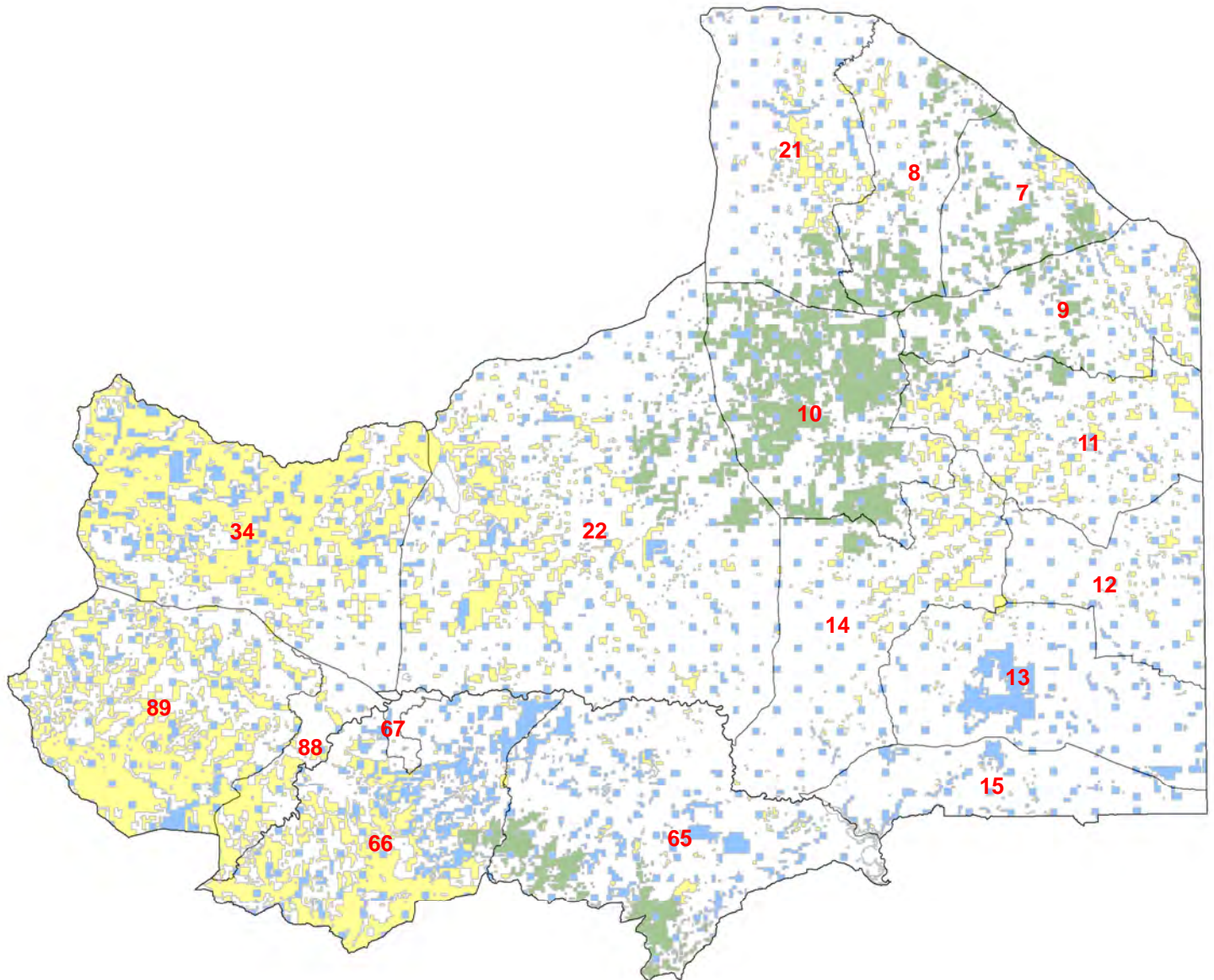
Currently there is no population model that accurately represents this herd. Management is instead based on postseason buck ratios with a goal of maintaining  $\geq 20$  bucks per 100 does.

### **Management Summary**

Traditional season dates in this herd vary from one hunt area to the next. Generally, white-tailed deer seasons run concurrently with October mule deer seasons, and are extended into November to maximize hunter opportunity and harvest. The 2013 season includes 1,150 Type 3 licenses, 1,400 Type 8 licenses, and additional opportunities to harvest white-tailed deer on General, Type 1, and Type 6 licenses. Type 3 and Type 8 licenses were reduced by 100 each in areas where access on private lands has decreased slightly. Goals for 2013 are to maintain buck ratios, provide hunter opportunity, and address agricultural damage on private lands.

If we attain the projected harvest of 1,360 with fawn ratios similar to the five-year average, buck ratios should be maintained above 20 per 100 does.

**Central White-tailed Deer Herd Unit  
(WD707)  
Revised May 12, 2010  
Hunt Areas 7-15, 21, 22, 34, 65-67, 88, 89**





## 2012 - JCR Evaluation Form

SPECIES: Elk

PERIOD: 6/1/2012 - 5/31/2013

HERD: EL740 - BLACK HILLS

HUNT AREAS: 1, 116-117

PREPARED BY: JOE SANDRINI

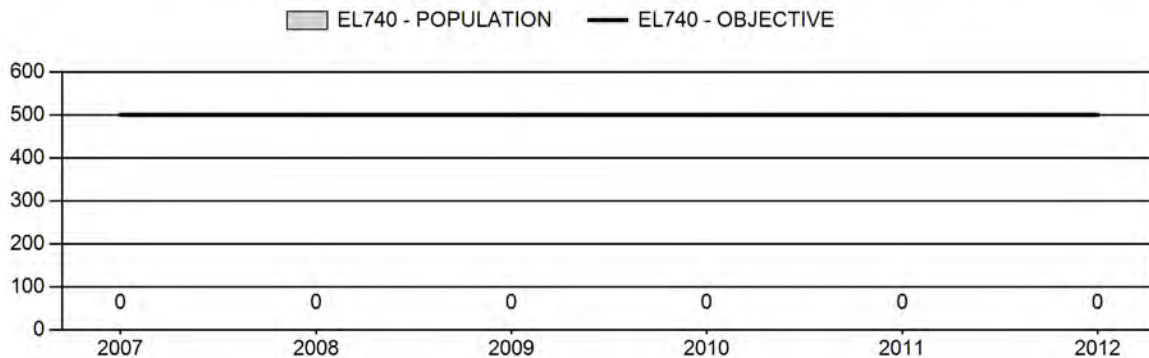
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	0	N/A	N/A
Harvest:	530	514	625
Hunters:	997	1,416	1,560
Hunter Success:	53%	36%	40 %
Active Licenses:	1,030	1,474	1,600
Active License Percent:	51%	35%	39 %
Recreation Days:	10,534	17,330	12,500
Days Per Animal:	19.9	33.7	20
Males per 100 Females	0	0	
Juveniles per 100 Females	0	0	

Population Objective:	500
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	N/A%
Number of years population has been + or - objective in recent trend:	0
Model Date:	None

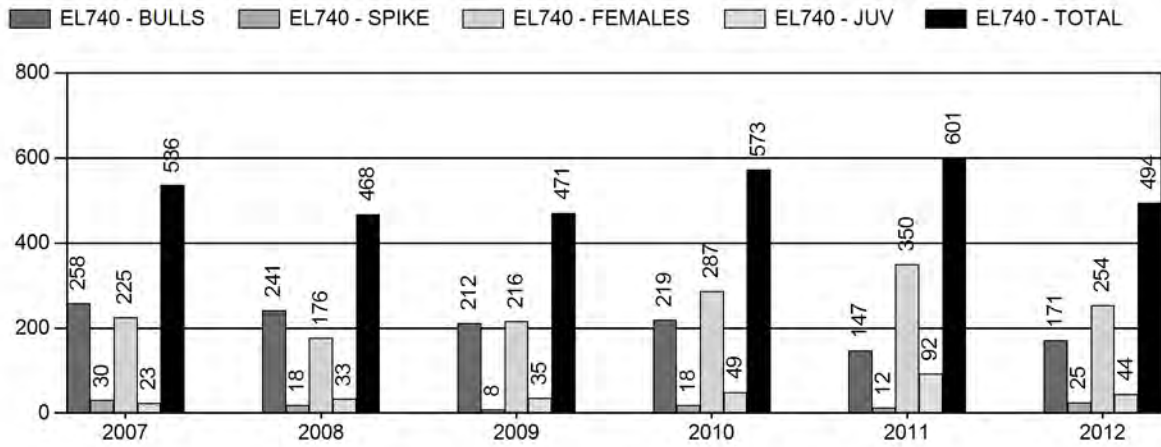
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq$ 1 year old:	n/a%	n/a%
Males $\geq$ 1 year old:	n/a%	n/a%
Juveniles (< 1 year old):	n/a%	n/a%
Total:	n/a%	n/a%
Proposed change in post-season population:	n/a%	n/a%

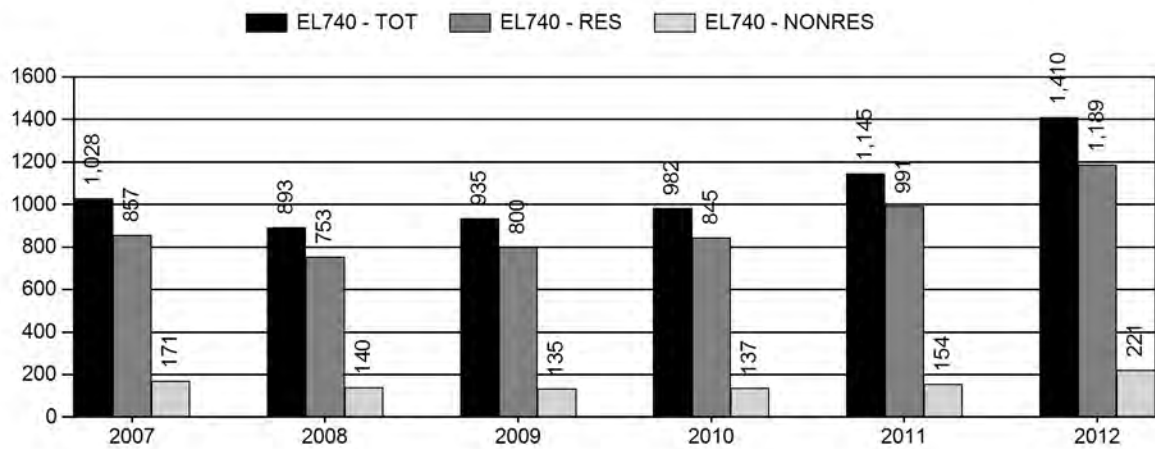
## Population Size - Postseason



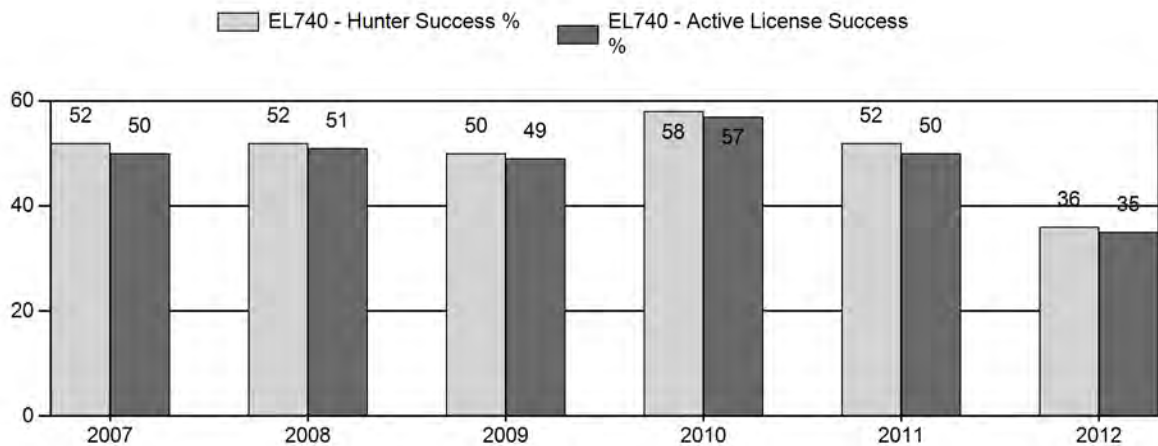
## Harvest



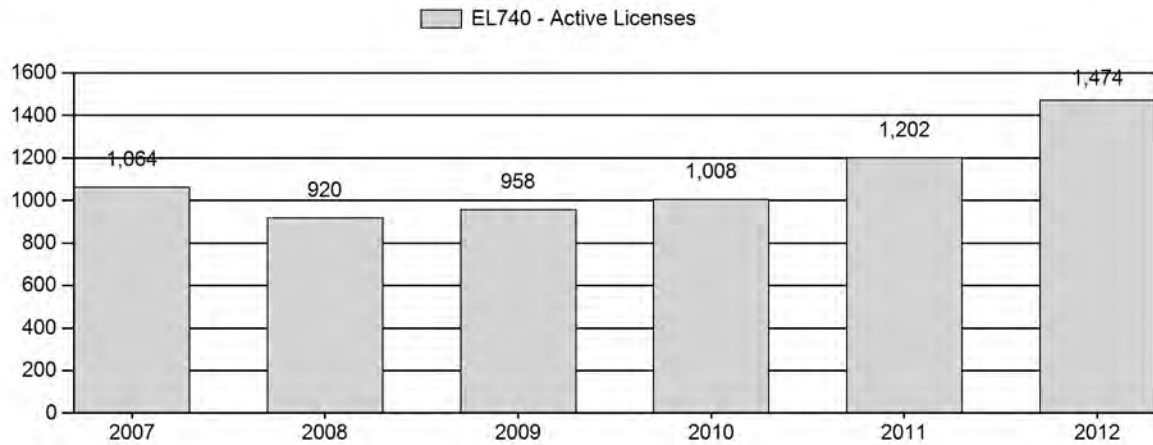
## Number of Hunters



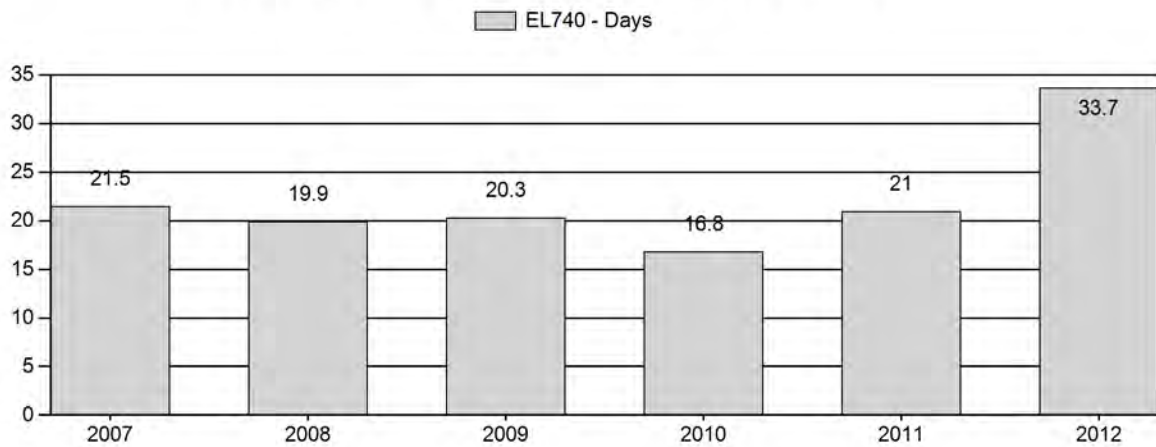
## Harvest Success



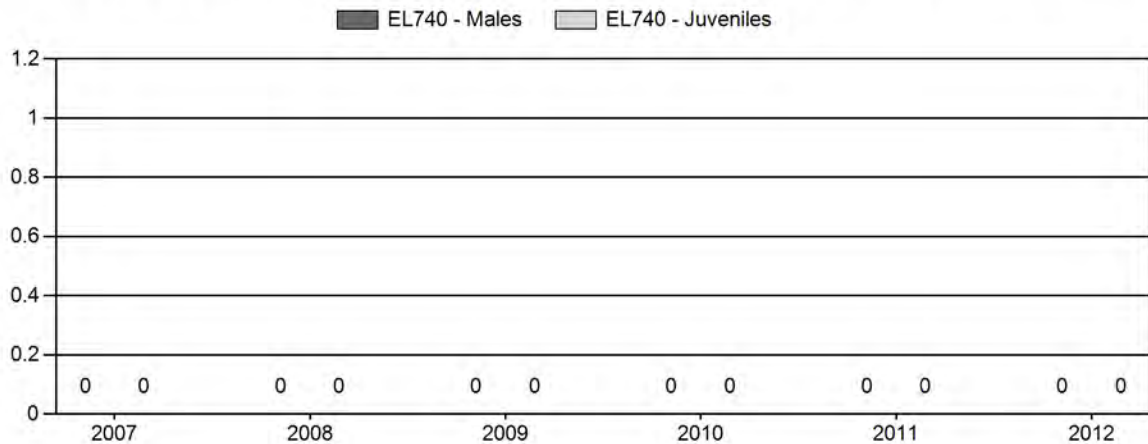
## Active Licenses



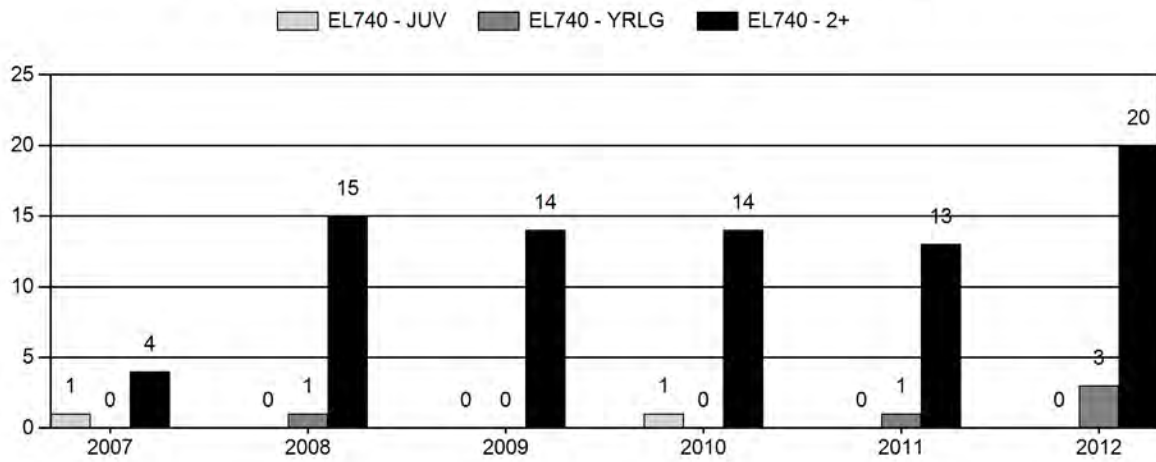
## Days per Animal Harvested



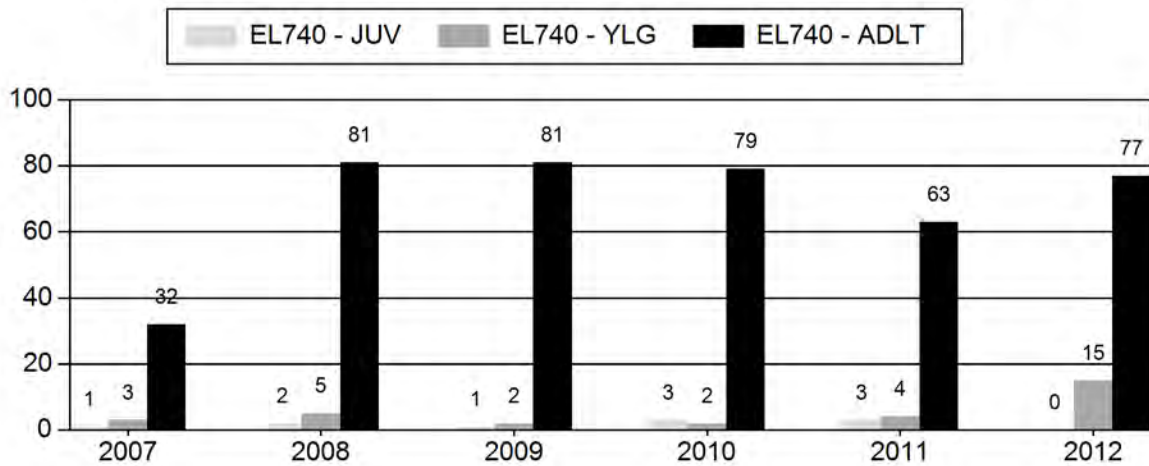
## Postseason Animals per 100 Females



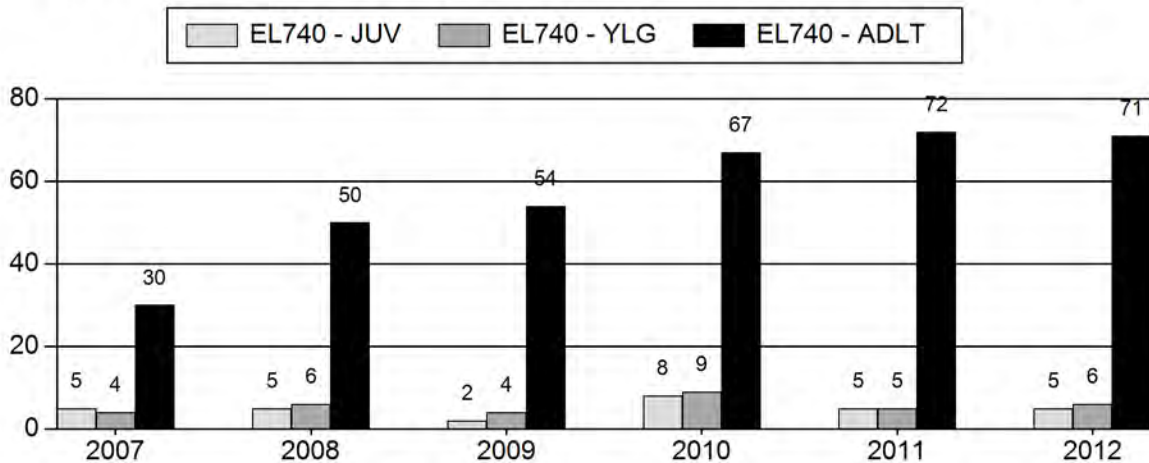
## Age Structure of Field Checked Males



## Age Structure Data (Field and Laboratory) - Male



## Age Structure Data (Field and Laboratory) - Female



**2013 HUNTING SEASONS  
BLACK HILLS ELK HERD (EL740)**

Hunt Area	Type	Season Dates		Quota	Limitations
		Opens	Closes		
1	1	Oct. 15	Nov. 30	100	Limited quota licenses; any elk
	4	Oct. 15	Nov. 30	75	Limited quota licenses; antlerless elk
116		Oct. 15	Nov. 10		General license; any elk
		Nov. 11	Nov. 30		General license; antlerless elk
	6	Oct. 15	Jan. 31	250	Limited quota licenses; cow or calf
	8	Aug. 15	Oct. 14	50	Limited quota licenses; cow or calf valid off national forest
117	1	Oct. 15	Nov. 30	275	Limited quota licenses; any elk
		Dec. 1	Jan. 31		Unused Area 117 Type 1 licenses valid for antlerless elk
	4	Oct. 15	Jan. 31	250	Limited quota licenses; antlerless elk
	6	Oct. 15	Jan. 31	250	Limited quota licenses; cow or calf
	8	Aug. 15	Oct. 14	50	Limited quota licenses; cow or calf valid off national forest
Archery		Sept. 1	Sept. 30		Refer to license type and limitations in Section 3

Hunt area	Type	Change from 2012
1	1	-50
	4	-25
116	1	-200 *
	4	-100 *
	6	+100
	8	+50
117	1	-75
	4	-50
	6	-125
<b>Herd Unit Total</b>	<b>1</b>	<b>-325</b>
	<b>4</b>	<b>-175</b>
	<b>6</b>	<b>-25</b>
	<b>8</b>	<b>+50</b>

*\* Replaced with General License*

### **Management Evaluation**

**Current Management Objective:** 500

**Management Strategy:** Recreational

**2012 Postseason Population Estimate:** None (Field Estimate ~ 3,000)

**2013 Proposed Postseason Population Estimate:** None (Field Estimate ~ 3,000)

**HERD UNIT ISSUES:** The management objective for the Black Hills Elk Herd Unit is a post-season population estimate of 500 elk, and the management strategy is recreational management. The objective was set in 1993 and is currently being revised towards a set of Administration-approved, non-numerical objectives, under the private land management strategy.

We can neither construct a population model, nor generate a population estimate for this herd as the Department has never been able to collect meaningful classification data. Additionally, radio collar data show substantial numbers of elk regularly cross the Wyoming/South Dakota Stateline violating the closed population assumption of population models. Consequently, no attempts have been made to model this population since 1996. Instead, this herd has been managed in an ad hoc fashion to provide ample recreational opportunity and address depredation complaints. In many locations across the herd unit, management of elk numbers has been hampered due to constrained access to private land for elk hunting. Consequently, a large part of this herd unit was placed into general license elk Hunt Area (HA) 129 in 2008.

The Black Hills Elk Herd Unit is currently comprised of HA 1, 116, & 117, as redefined in 2013. It is located in the northeast corner of Wyoming, and encompasses approximately 3,100 mi<sup>2</sup>, of which about 1,650 mi<sup>2</sup> are considered occupied habitat. The majority of the occupied habitat is private land. HA 1 is 95% public land, and represents the largest contiguous block of public land extensively inhabited by elk. Elk do occur on other portions of the Black Hills National Forest

and dispersed sections of State and other federally owned lands. However, harvest and elk use in those areas is neither ubiquitous, nor consistent.

The herd unit boundary has been revised several times over the past 30 years, as elk hunt area boundaries were altered. The herd's seasonal range map was last updated in 2003 using field observations and contacts with landowners to make delineations. Changes to crucial winter range were not made at the time due to the lack of protracted, severe winter weather. Also in 2003, a small portion of the Black Hills formerly outside the Herd Unit (Elk Mountain) was included to better reflect elk distribution and habitat. In 2008, Elk Mountain was incorporated into HA 117, while the northwest third of this Hunt Area and a large portion of HA 116 were placed into HA 129. However, the herd unit boundary and seasonal range map were not adjusted to reflect these changes. With the redefinition of HA 116 for the 2013 hunting season, the three Elk Hunt Areas comprising this herd unit now encapsulate Wyoming's Black Hills ecosystem, and future changes in Hunt Area boundaries are not anticipated. After approval of the proposed objective change, Herd Unit boundary and seasonal range maps will be updated.

**WEATHER:** Drought conditions, which were persistent throughout the Black Hills between 2000 and 2007, began to moderate in 2008. Between 2008 and 2012, annual temperatures were below the previous 30-year average and annual precipitation each year above the previous 30-year average; and 2010 was significantly colder and wetter than both the 30-year and 100-year averages (<http://lwf.ncdc.noaa.gov/temp-and-precip/time-series>). The predominant weather pattern was characterized by generally cool summers, more persistent snow cover in late fall and winter, and above normal spring moisture. The combination of average winter weather and fair forage conditions seemed to have been neither detrimental, nor beneficial for Black Hills elk; but did result in localized depredation complaints in late December and early January each year. These were more pronounced during the winter of 2010-11, which saw periods of extended low temperatures and persistent, deep snow cover. Since the late 1890's, only five other winters were as cold and snowy as the 2010-11 winter. This tough winter preceded bio-year 2012, which was one of the driest on record. Warm and dry conditions beset the area in April of 2012, and continued through the 2012-13 winter. April of 2013 finally saw a break in this pattern when temperatures dropped below normal for the entire month and significant precipitation was again received (<http://www.ncdc.noaa.gov/temp-and-precip/>). Overall, the weather pattern during bio-year 2012 resulted in poor forage production and led to several large wildfires in the southern half of the herd unit.

Based on weather and habitat conditions over the past five years, it is likely elk have entered the winter in fair condition most years. More normal winter temperatures and precipitation did increase winter stress on elk compared to the previous decade, as did the drought of 2012, and winter forage availability appeared to decline during the reporting period. In summary, weather the past several years, while not favorable for elk, has not been overly detrimental.

**HABITAT:** The Black Hills is the western most extension of many eastern plant species. These species are often mixed with more typical western plants providing a large variety of habitats used by elk. Ponderosa pine (*Pinus ponderosa*) is the predominant overstory species. There are scattered patches of quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), bur oak (*Quercus macrocarpa*), and in the southern hills mountain mahogany (*Cercocarpus*

*montanus*). Many of these stands are in late successional stages. Important shrubs include Saskatoon serviceberry (*Amelanchier alnifolia*), Oregon grape (*Berberis repens*), common chokecherry (*Prunus virginiana*), and wild spiraea (*Spiraea betulifolia*). Since 2000, wildfires in both Wyoming and South Dakota have burned well over 10% of the Black Hills National Forest (BHNF) and significant areas of private land in this ecosystem. These fires have been beneficial for elk by creating early successional plant communities and increasing available forage.

Elk habitat quantity and quality are good, but security areas may be decreased or lacking in areas due to high road densities. Road densities, along with vast tracts of commercially thinned ponderosa pine stands, do not provide what is usually considered classic, good elk habitat. Despite the lack of cover in areas and numerous roads, the elk population expanded through most of the previous decade. Several factors have benefited this population. First, herbaceous forage is abundant, and wildfires have increased elk forage. Second, despite high road densities, much of the land inhabited by elk is privately owned. This private land experiences limited human activity, so roads there may not significantly impact elk. Many of these same private land areas provide elk refuge from hunting pressure during the fall. The USFS has also increased the number of road closures on the Black Hills National Forest in the past 10-years, and recently adopted a revised travel management plan, although enforcement of closures is lax.

Currently, there are no habitat evaluation or vegetation surveys located within this Herd Unit related directly to elk forage or cover. A single mountain mahogany, and two bur oak, production and utilization transects were established within the Herd Unit in 2003 to quantify habitat conditions related to deer management.

**FIELD DATA:** Collection of classification data was suspended in this herd in 1996. However, tooth age data have been collected from harvested elk since 1987.<sup>1</sup> Tooth age data can estimate annual recruitment by considering the percentage of yearlings in the female segment of the harvest (Figure 1). Since 1987, this figure has averaged<sup>2</sup> 17% (std. dev. 8.1%), suggesting just under 20 yearling bulls and 20 yearling cows are normally added per 100 adult cows into this population annually. However, recruitment of yearling elk has declined since 2000. Between 1987 and 1999, as this herd grew rapidly, older age classes of female elk were well distributed throughout the harvest and there was an increasing percentage of yearling cows represented in the harvest; but, this trend reversed itself beginning in 2000 (Figure 1). A Student's T-Test indicates yearling recruitment was significantly higher between 1987 and 1999 when there were an average of 20% yearlings in the female harvest, versus an average of 11% after 2000 ( $p=0.0004$ )<sup>3</sup>. Since 2000, with significantly increased license issuance and extended hunting seasons, there has been a general increase in the percentage of female elk over age 5 harvested (Figures 2). Of course there is greater hunter selectivity when it comes to take of bulls, and since 2006, tooth age data has revealed fairly consistent, relative percentages of middle aged males in the harvest (3-5 year old bulls), with a slight increase in the percentage of older bulls harvested (Figure 3).

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<sup>1</sup> Budgetary constraints prevented tooth age data collection in 2002 & 2003.

<sup>2</sup> Omitting 1990 data reduces this average to 16% with a std. dev. 6.0%.

<sup>3</sup> Including 1990 data in T-test yields a significant difference ( $P=0.0001$ ), with Mean 1987-1990 = 22%; and Mean 2000-2012= 10.9%.



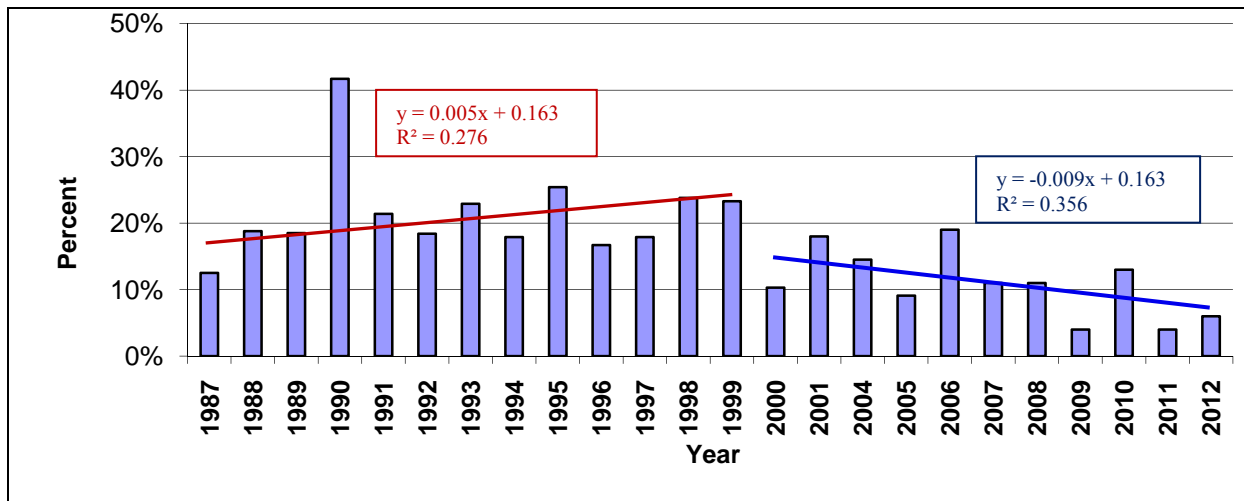


Figure 1. Percentage of yearlings in the female segment of the elk harvest (1987 – 2012).  
(Note, trend lines exclude 1990 datum)

**HARVEST:** The low number of yearling females present in the harvest in recent years suggests reduced recruitment, as does the fact elk are not pioneering into unoccupied habitats as they once were. However, while adequate harvest may be achieved south of I-90, poor success by hunters pursuing female elk in HA 116 is could be allowing that portion of the herd to grow. This stems from a few landowners restricting access to the majority of elk during the hunting season. But, it is difficult to gauge total take and the potential rate of increase north of I-90 because a substantial portion of HA 116 was moved into General License HA 129 in 2008. Due to harvest survey constraints, there is no way to determine how many elk are being harvested in the former part of HA 116 which is now in HA 129. Consequently, the bulk of tooth age data are returned from HA 1 and 117, any decrease in recruitment should only be ascribed south of I-90.

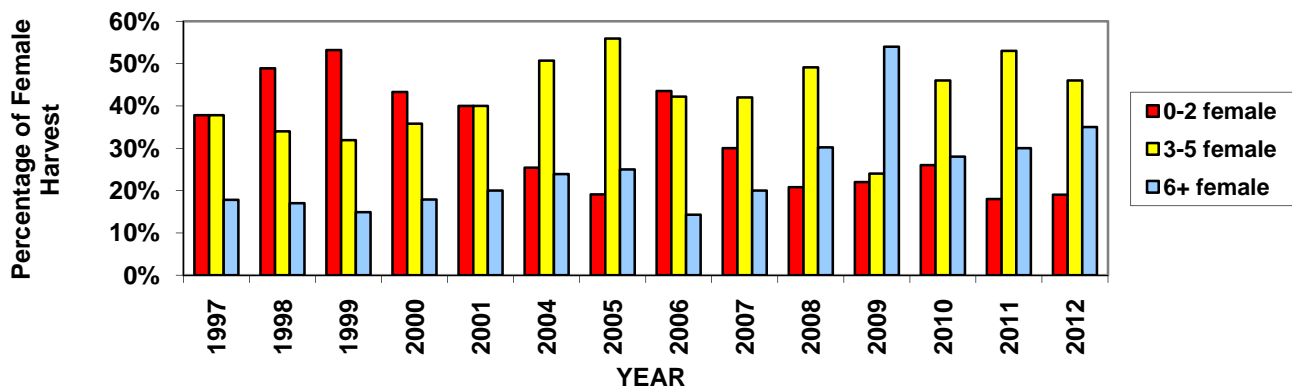


Figure 2. Relative percentages of various age classes of female elk harvested (1997 – 2012).

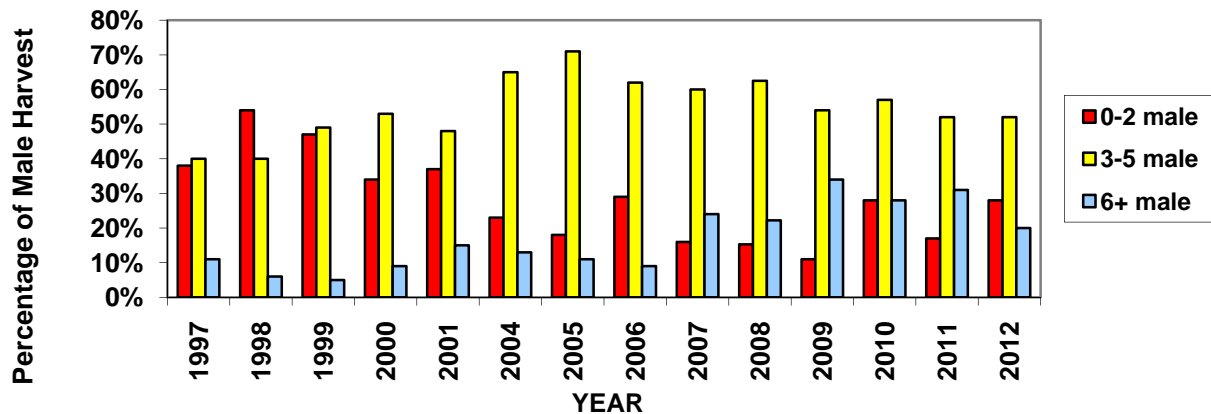


Figure 3. Relative percentages of various age classes of male elk harvested (1997 – 2012).

Limited quota license issuance and harvest are positively correlated in this herd unit. Between 1992 and 2002, license issuance increased exponentially while harvest increased linearly. Between 2002 and 2010 changes in harvest were not as disparate with changes in license issuance. But, over the past two years, license issuance again has substantially outpaced increases in harvest. Consequently, hunter success has dropped. Overall, the average rate of increase in license issuance since 1995 has been about 160% that of harvest (Figure 4).

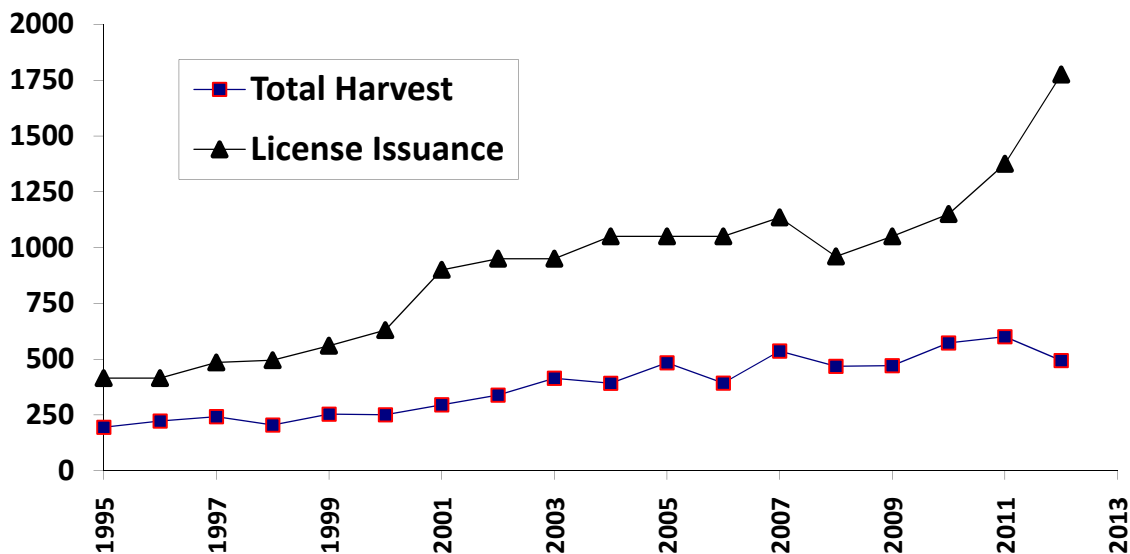


Figure 4. Limited quota license issuances & elk harvest in the Black Hills herd unit (1996 – 2012). Note, in 2008 large portions of Hunt Areas 116 & 117 were put in General License Hunt Area 129.

Access to private land for hunting remains limited, and field personnel are having great difficulty placing the increased number of hunters, many of whom make repeated phone calls to local game managers and landowners without securing a place to hunt.

Given average yearling recruitment based upon tooth age data, and assuming a pre-season herd composition of 40 bulls per 100 cows and 47 calves per 100 cows (based on SDGF&P data), the 2012 estimated harvest of 515 elk would have removed the annual recruitment of yearlings from a total population of about 4,400 elk. As such, the 2012 harvest probably served to keep this elk herd in check or reduce it, because it is unlikely the Wyoming portion of the Black Hills currently harbors in excess of 4,000 elk.

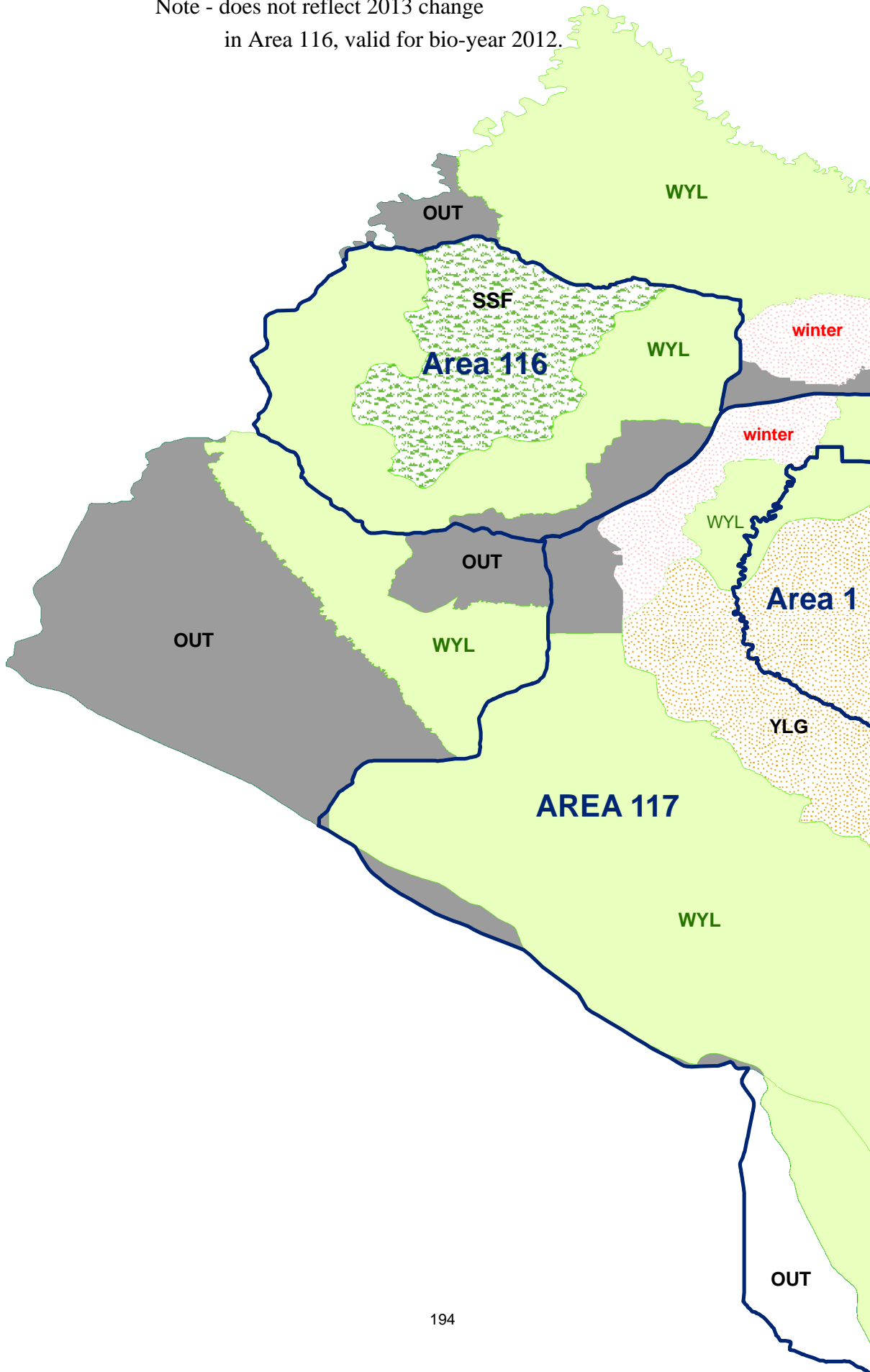
**POPULATION:** Despite the lack of a population estimate, indications are elk numbers increased quite a bit over the past 30 years. The population appeared to increase rapidly during the 1990's and early part of the next decade when elk significantly expanded their distribution. Silvicultural practices and wildfires throughout the region have created habitat favorable for elk. Although habitat changes have favored elk in recent years, elk have not continued to pioneer into previously unoccupied areas. Harvest statistics and tooth age data also suggest population growth may have been curbed recently, at least south of Interstate Highway 90 (I-90). Given the high quality habitat in the region and limited access to hunt elk on private land, this population will likely continue to grow in areas where limited hunter take, due to access constraints, thwarts efforts to augment harvest.

**MANAGEMENT SUMMARY:** Changes implemented for the 2013 Black Hills elk hunting season consisted of redefining HA 116 to include all of the lands within Wyoming's Black Hills ecosystem previously enrolled in HA 116 and HA 129. This "new" Hunt Area will be hunted under a combination of General Licenses, and type 6 and 8 cow/calf tags. Because hunter success and satisfaction have dropped south of I-90, we have reduced issuance of all license types in HA 1 and HA 117. Based on past experience, this should not negatively impact harvest here, as success was much reduced in 2012.

Given hunter success rates based upon the mean of 2011 and 2012 figures, the 2013 harvest should result in about 625 elk taken. This harvest estimate is predicated on an approximation of the number of elk to be harvested in the revised HA 116 on General Licenses. However, the long season for antlerless elk hunting in Hunt Areas 116 and 117 (five and a half months) could increase antlerless harvest above predicted values. This is because the collection and analysis of harvest survey data is timed such that we may not adequately capture very late season harvest of elk. If projected harvest levels are reached, elk numbers may decline south of I-90, while elk numbers are anticipated to stabilize or could grow slightly north of the Interstate. Based on estimated herd composition and recruitment rates, a harvest of 625 elk would remove the annual recruitment from a herd of about 5,350 elk.

# Black Hills Elk Herd (EL740)

Note - does not reflect 2013 change  
in Area 116, valid for bio-year 2012.



## 2012 - JCR Evaluation Form

SPECIES: Elk

PERIOD: 6/1/2012 - 5/31/2013

HERD: EL741 - LARAMIE PEAK/MUDDY MOUNTAIN

HUNT AREAS: 7, 19

PREPARED BY: HEATHER  
O'BRIEN

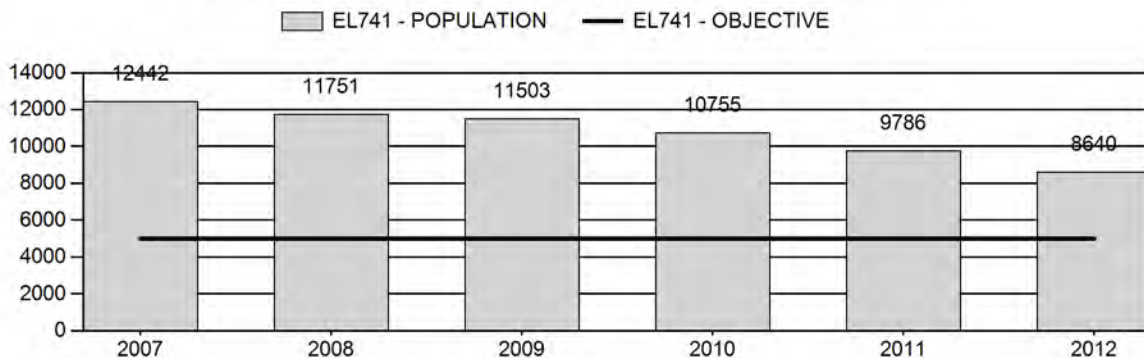
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	11,247	8,640	7,362
Harvest:	2,307	2,275	2,630
Hunters:	4,150	4,506	4,600
Hunter Success:	56%	50%	57%
Active Licenses:	4,236	4,557	4,800
Active License Percent:	54%	50%	55%
Recreation Days:	32,368	35,334	35,000
Days Per Animal:	14.0	15.5	13.3
Males per 100 Females	33	38	
Juveniles per 100 Females	42	28	

Population Objective:	5,000
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	73%
Number of years population has been + or - objective in recent trend:	12
Model Date:	5/6/2013

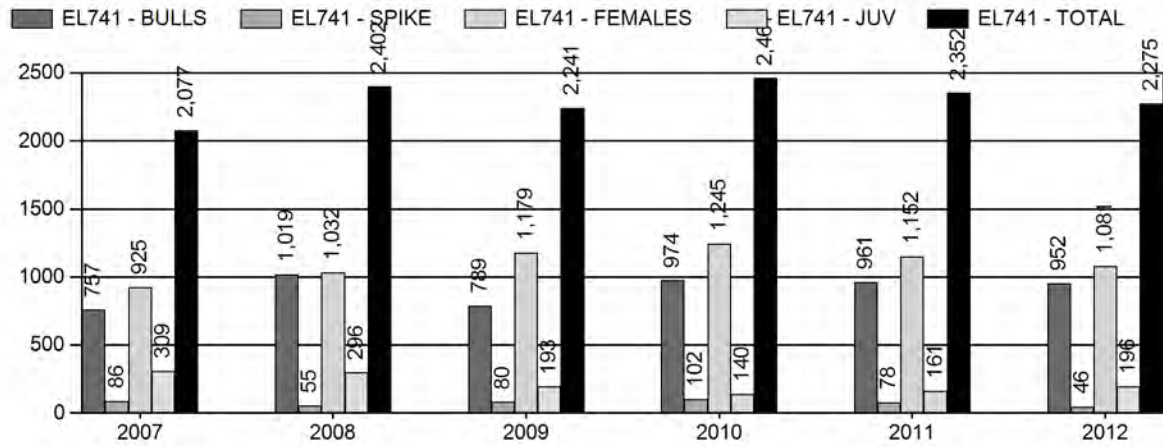
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq$ 1 year old:	19.4%	26.9%
Males $\geq$ 1 year old:	32.5%	40.9%
Juveniles (< 1 year old):	12.1%	10.9%
Total:	20.4%	25.6%
Proposed change in post-season population:	-11.8%	-14.8%

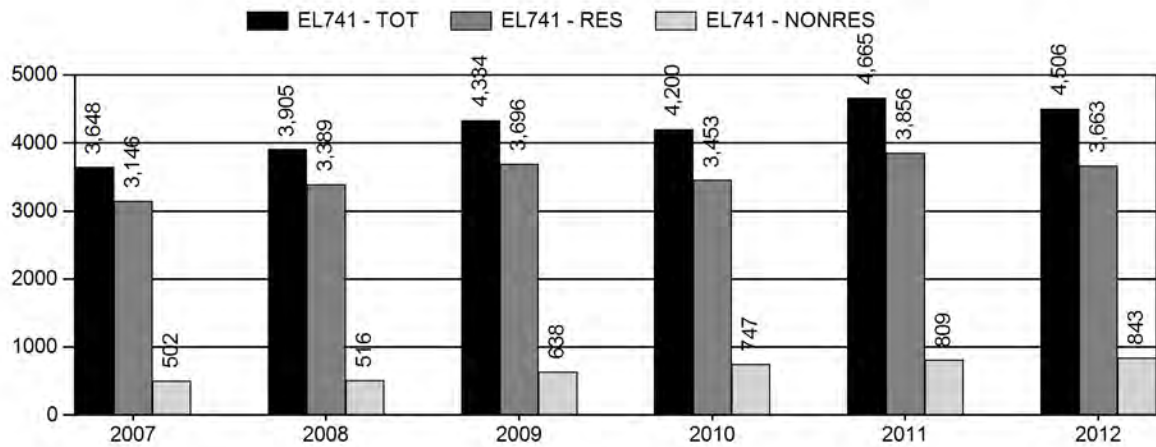
## Population Size - Postseason



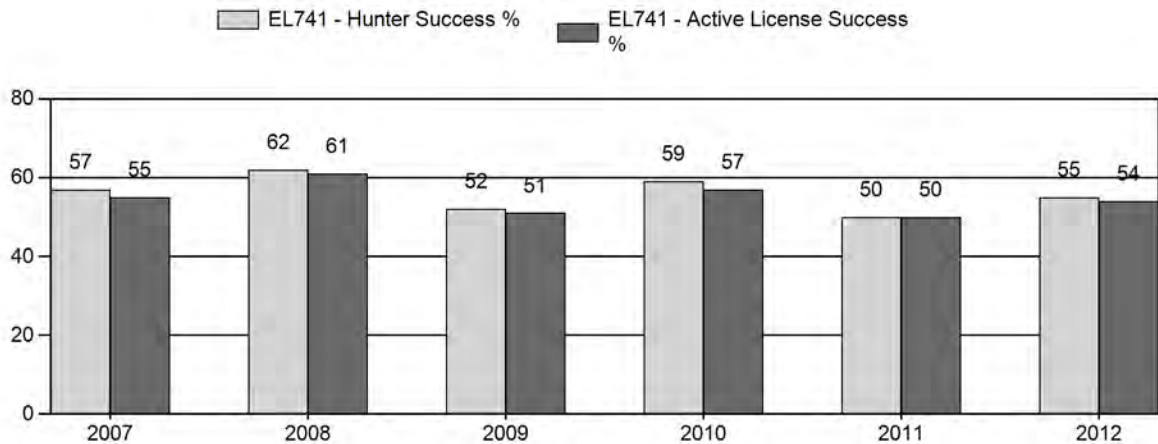
## Harvest



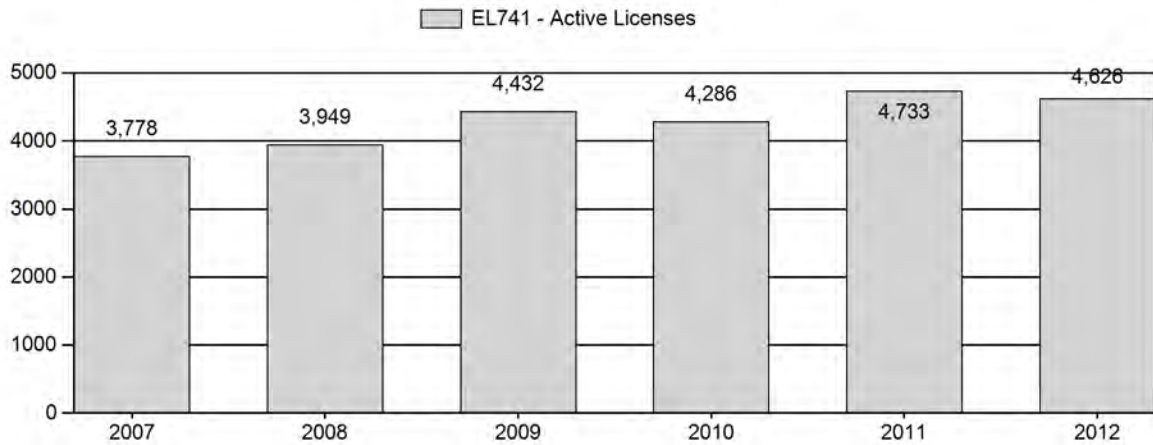
## Number of Hunters



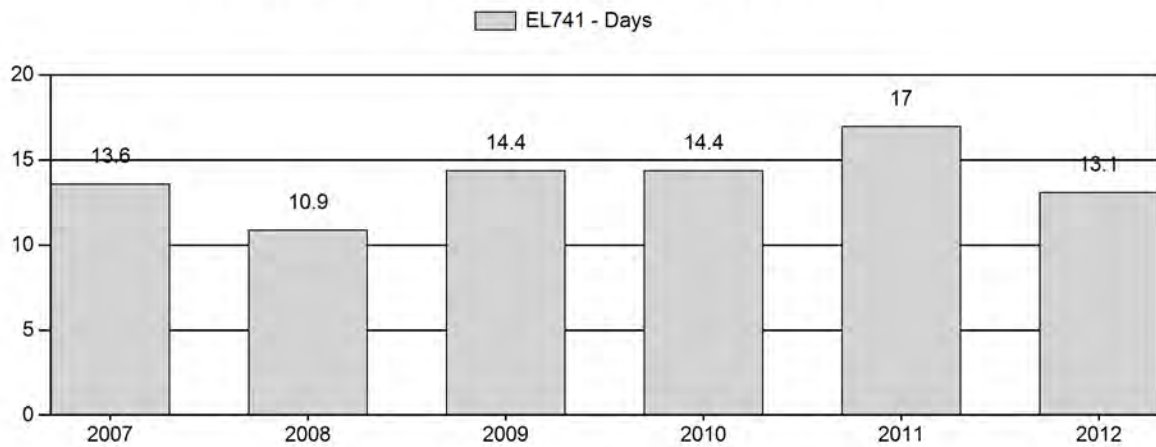
## Harvest Success



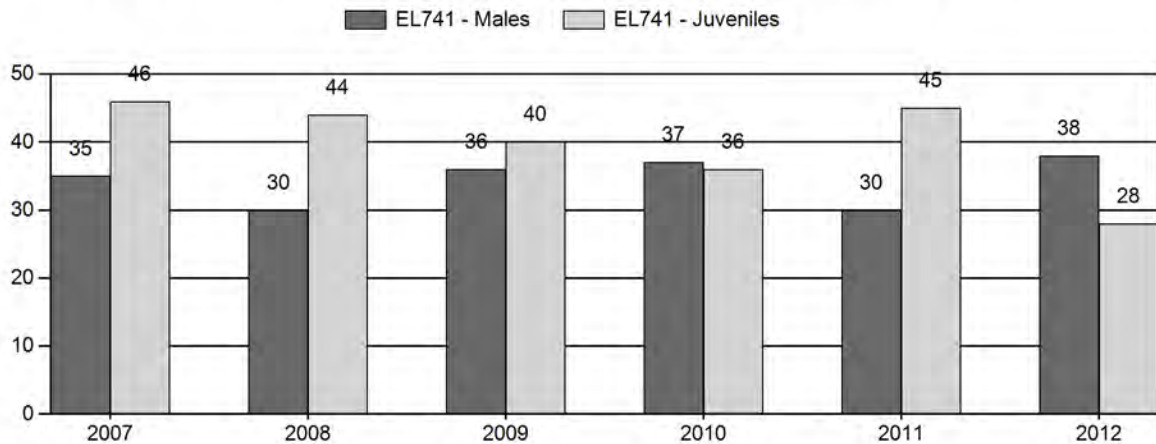
## Active Licenses



## Days per Animal Harvested



## Postseason Animals per 100 Females



**2007 - 2012 Postseason Classification Summary**

for Elk Herd EL741 - LARAMIE PEAK/MUDDY MOUNTAIN

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	12,442	273	412	685	19%	1,973	55%	899	25%	3,557	748	14	21	35	± 2	46	± 2	34
2008	11,751	297	512	809	17%	2,720	57%	1,208	26%	4,737	679	11	19	30	± 1	44	± 2	34
2009	11,662	259	572	831	21%	2,281	57%	908	23%	4,020	607	11	25	36	± 2	40	± 2	29
2010	10,946	475	639	1,114	21%	3,020	58%	1,094	21%	5,228	545	16	21	37	± 1	36	± 1	26
2011	10,000	324	548	872	17%	2,890	57%	1,298	26%	5,060	539	11	19	30	± 1	45	± 1	35
2012	8,523	143	362	505	23%	1,334	60%	379	17%	2,218	617	11	27	38	± 2	28	± 2	21



**2013 HUNTING SEASONS**  
**LARAMIE PEAK MUDDY MOUNTAIN ELK (EL741)**

<b>Hunt Area</b>	<b>Type</b>	<b>Date of Seasons</b>		<b>Quota</b>	<b>Limitations</b>
<b>Opens</b>	<b>Closes</b>				
7	1	Oct. 15	Nov. 20	1,750	Limited quota licenses; any elk
		Nov. 21	Dec. 31		Unused Area 7 Type 1 licenses valid for antlerless elk
	4	Oct. 15	Dec. 31	1,250	Limited quota licenses; antlerless elk
	6	Aug. 15	Oct. 14	1,750	Limited quota licenses; cow or calf valid in those portions of Area 7 in Platte County and on private land in Albany County
		Oct. 15	Dec 31		Unused Area 7 Type 6 licenses valid in the entire area
	7	Jan. 1	Jan. 31	250	Limited quota licenses; cow or calf
	8	Aug. 12	Aug. 31	50	Limited quota licenses; cow or calf valid off national forest in that portion of Area 7 in Converse County
19	1	Oct. 1	Oct. 14	150	Limited quota licenses; any elk
	2	Nov. 1	Nov. 20	150	Limited quota licenses; any elk
	4	Oct. 1	Oct. 14	125	Limited quota licenses; antlerless elk
	5	Nov. 1	Dec. 31	125	Limited quota licenses; antlerless elk
	6	Oct. 1	Oct. 14	200	Limited quota licenses; cow or calf
		Nov. 1	Dec. 31		Unused Area 19 Type 6 licenses
		Nov. 21	Dec. 31		Unused Area 19 Type 1, Type 2, and Type 4 licenses valid for antlerless elk
Archery		Sept. 1	Sept. 30		Refer to licenses and type limitations in Section 3.

Hunt Area	Type	Quota change from 2012
7	1	+250
	4	0
	6	0
	7	+200
	8	0
19	1	0
	2	0
	4	0
	5	0
	6	0
Total	1	+250
	7	+200

### **Management Evaluation**

**Current Postseason Population Management Objective:** 5,000

**Management Strategy:** Special

**2012 Postseason Population Estimate:** 8,600

**2013 Proposed Postseason Population Estimate:** 7,400

The Laramie Peak / Muddy Mountain Elk Herd Unit has a postseason population management objective of 5,000 elk. The herd is managed using the special management strategy, with a goal of maintaining postseason bull ratios between 30-40 bulls per 100 cows and a high percentage of branch-antlered bulls in the male harvest segment. The objective and management strategy were last revised in 2001, and will be formally reviewed again in 2013.

### **Herd Unit Issues**

Hunting access within the herd unit is variable, with a mix of national forest, state lands, and private lands. The addition of walk-in and hunter management areas greatly expands access to hunting opportunity within the herd unit as well. Landowners offer varying levels of access to hunting. While most landowners offer some form of access – whether it be free or fee hunting – there are a few ranches that offer little access. These areas tend to harbor high numbers of elk that are inaccessible during hunting seasons. The main land use within the herd unit is traditional ranching and grazing of livestock; however several properties in the herd unit have become “non-traditional” in that they are owned by individuals who do not make a living by ranching their lands. Industrial-scale developments are minimal within this herd unit, though there is potential for the expansion of wind energy development. Chronic Wasting Disease is present in this herd at low prevalence (8% in 2012 hunter-harvested elk).

## **Weather & Habitat**

The winter of 2011-2012 was mild with below average snow accumulations and relatively warm temperatures. The summer and fall of 2012 and early winter of 2013 were extremely dry with above average temperatures. During the same time period, forage growth, forage quality, and available water were well below average. Fires were also quite prevalent in the herd unit during the 2012 season, and some portions of the population were forced out of their summer ranges and into adjacent areas. Elk were likely crowded onto marginal habitat following several larger fires. The combined drought and fire events resulted in very poor calf ratios (28:100) observed during 2012 postseason classification surveys. While habitat conditions were extremely poor in 2012, mild conditions and lack of snow allowed elk to remain more dispersed and at higher elevations for the first part of the 2012-2013 season.

## **Field Data**

Calf ratios are typically in the 40s per 100 cows for the Laramie Peak / Muddy Mountain Elk Herd. While calf survival can be variable from year to year, adult elk in this herd are thought to have rather high rates of survival as there are few natural predators and little mortality from disease and winter weather. Prior to 2005, antlerless license issuance was not adequate to keep up with the production of this herd. Since then, antlerless license issuance has continued to increase, and the population has begun to decrease as harvest pressure on cows has greatly intensified. In 2012, the calf ratio reached a record low of only 28 calves per 100 cows. At the same time, a record number of antlerless licenses were issued, and a record number of cows were harvested. While the low calf ratio of 2012 will contribute to population decline, continued high license issuance and harvest of cows will be necessary to further reduce this herd toward objective.

Bull ratios for the Laramie Peak / Muddy Mountain Herd historically average in the mid-30s per 100 cows, though there have been years where the ratio has dropped below special management limits into the 20s. Issuance of Type 1 any elk licenses has consistently increased in the herd unit along with population growth, and has remained high since 2009. In 2011, it appeared that high Type 1 license issuance may have been taking its toll, as the observed bull ratio dropped to 30 per 100 cows. Despite the drop in license issuance in 2012, total bull harvest actually increased in 2012. Improved access resulting from lack of snow, reduced hunter crowding, and/or changes in elk distribution may have influenced this increase in harvest. Despite the higher harvest in 2011, the 2012 the observed bull ratio was 38 per 100 cows – well within special management parameters.

## **Harvest Data**

License success in this herd unit is typically in the 50<sup>th</sup> percentile. Hunter days per animal have generally increased since 2008, as the population has dropped in size and more effort is necessary to harvest an elk. It should be noted that days per animal can also be high in this herd unit as hunters have high expectations regarding bull quality, and will exert more effort in finding a mature bull. Days per animal dropped markedly in 2012 however, indicating that hunters had an easier time compared to the 2009-2011 seasons. Again, drought and fire conditions may have changed the distribution of elk in 2012, and mild winter conditions made accessing higher elevations easier for hunters. Overall harvest success in 2012 (51%) was slightly lower than the average harvest success of the previous ten years (55%).

## **Population**

The 2012 postseason population estimate was approximately 8,500 and trending downward from an estimated high of 12,300 elk in 2005. Postseason classification data and harvest data are applied to the model to predict population size and trends for this herd. No sightability or other population estimate data are currently available to further align the model.

The “Time-Specific Juvenile Survival – Constant Adult Survival” (TSJ,CA) spreadsheet model was selected to represent the Laramie Peak / Muddy Mountain Herd Unit. This model seemed the most representative of herd dynamics, as it selects for higher juvenile survival during years when field personnel observed more favorable environmental and habitat conditions, particularly from 2004-2009. The simpler models (CJ,CA and SCJ,CA) select the lowest value for juvenile survival, which does not seem feasible for this herd. The TJS,CS,MSC model was not considered for the Laramie Peak / Muddy Mountain Herd, since it does not have a high level of natural predation. The other three models produce trends that seem representative for this herd, but the CJ,CA and SCJ,CA models estimate a population size that is unrealistically high. Surprisingly, the TSJ,CA model has the lowest AIC of all the models, but all models score similarly so the difference in AIC is unimportant in model selection for this herd. The TSJ,CA model appears to be the best representation relative to the perceptions of managers on the ground, and follows trends with license issuance and harvest success. Overall, this model is of fair quality.

## **Management Summary**

Season dates for this herd have changed from year to year, and in general have been liberalized over time to maximize harvest and reduce damage on agricultural fields. Season dates will be similar for the 2013 season, with a couple of minor changes. Area 7-Type 6 licenses will be

valid earlier in Platte and Albany Counties to address damage to agricultural fields on private lands, and all types except Type 7 licenses will close on December 31<sup>st</sup>. Area 7-Type 7 licenses will be valid in January only, so that managers can better direct these hunters to areas where landowners are providing access for late season elk hunting. Area 7-Type 1 licenses will be increased back to 1,750, to increase opportunity for bull elk hunting. Access is predicted to be similar in 2013 to previous years. Goals for 2013 are to continue reduction of the herd towards objective, to maintain bull ratios within special management limits, maintain good harvest success, and reduce elk damage to agricultural fields.

If we attain the projected harvest of 2,630 elk with average calf ratios, this herd will decline further toward objective. The predicted 2013 postseason population size of the Laramie Peak / Muddy Mountain Elk Herd is approximately 7,400 animals.

<b>INPUT</b>	
Species:	Elk
Biologist:	Heather O'Brien
Herd Unit & No.:	EL741 Laramie/Muddy
Model date:	02/21/12

☐ Clear form

MODELS SUMMARY				Relative AICc	Check best model to create report	Notes
CJ,CA	Constant Juvenile & Adult Survival	Fit	373	382	<input type="checkbox"/> CJ,CA Model	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	373	382	382	<input type="checkbox"/> SCJ,SCA Mod	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	217	336	336	<input type="checkbox"/> TSJ,CA Model	
TSJ,CA,MSC	Time-Specific Juv, Constant Adult Survival, Male survival coefficient	183	315	315	<input type="checkbox"/> TSJ,CA,MSC Model	

Population Estimates from Top Model									
Year	Posthunt Population Est. Field Est	Trend Count	Predicted Prehunt Population Juveniles	Total	Females	Predicted Posthunt Population Juveniles	Total Males	Females	Objective
1993			2661	8588	4772	2581	766	4480	5000
1994			2192	8623	5035	2118	1057	4672	5000
1995			1919	8592	5108	1864	1165	4831	5000
1996			2058	8866	5200	1987	1208	4642	5000
1997			2296	9236	5153	2160	1198	4863	5000
1998			2611	10603	5792	2478	1716	5230	5000
1999			2303	10349	5745	2218	1803	5249	5000
2000			2491	10510	5698	2354	1785	5163	5000
2001			2904	11690	6059	2830	2165	5653	5000
2002			2363	11439	6247	2257	2124	5763	5000
2003			2879	12752	6720	2690	2380	6224	5000
2004			2839	12615	6772	2718	2364	6278	5000
2005			3241	13757	7175	3110	2625	6375	5000
2006			2710	13434	7199	2546	2577	6437	5000
2007			3302	14554	7517	2962	2808	6500	5000
2008			3103	14264	7390	2778	2590	6254	5000
2009			2661	13968	7449	2449	2902	6152	5000
2010			2263	13462	7192	2109	2824	5822	5000
2011			2488	12373	6412	2311	2330	5145	5000
2012			1622	11143	6140	1406	2283	4950	5000
2013			1830	10255	5519	1610	1718	4034	5000
2014									5000
2015									5000
2016									5000
2017									5000
2018									5000
2019									5000
2020									5000
2021									5000
2022									5000
2023									5000
2024									5000
2025									5000

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.50		0.98	
1994	0.50		0.98	
1995	0.50		0.98	
1996	0.61		0.98	
1997	0.95		0.98	
1998	0.50		0.98	
1999	0.50		0.98	
2000	0.85		0.98	
2001	0.50		0.98	
2002	0.95		0.98	
2003	0.50		0.98	
2004	0.75		0.98	
2005	0.61		0.98	
2006	0.95		0.98	
2007	0.69		0.98	
2008	0.95		0.98	
2009	0.95		0.98	
2010	0.67		0.98	
2011	0.95		0.98	
2012	0.95		0.98	
2013	0.95		0.98	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

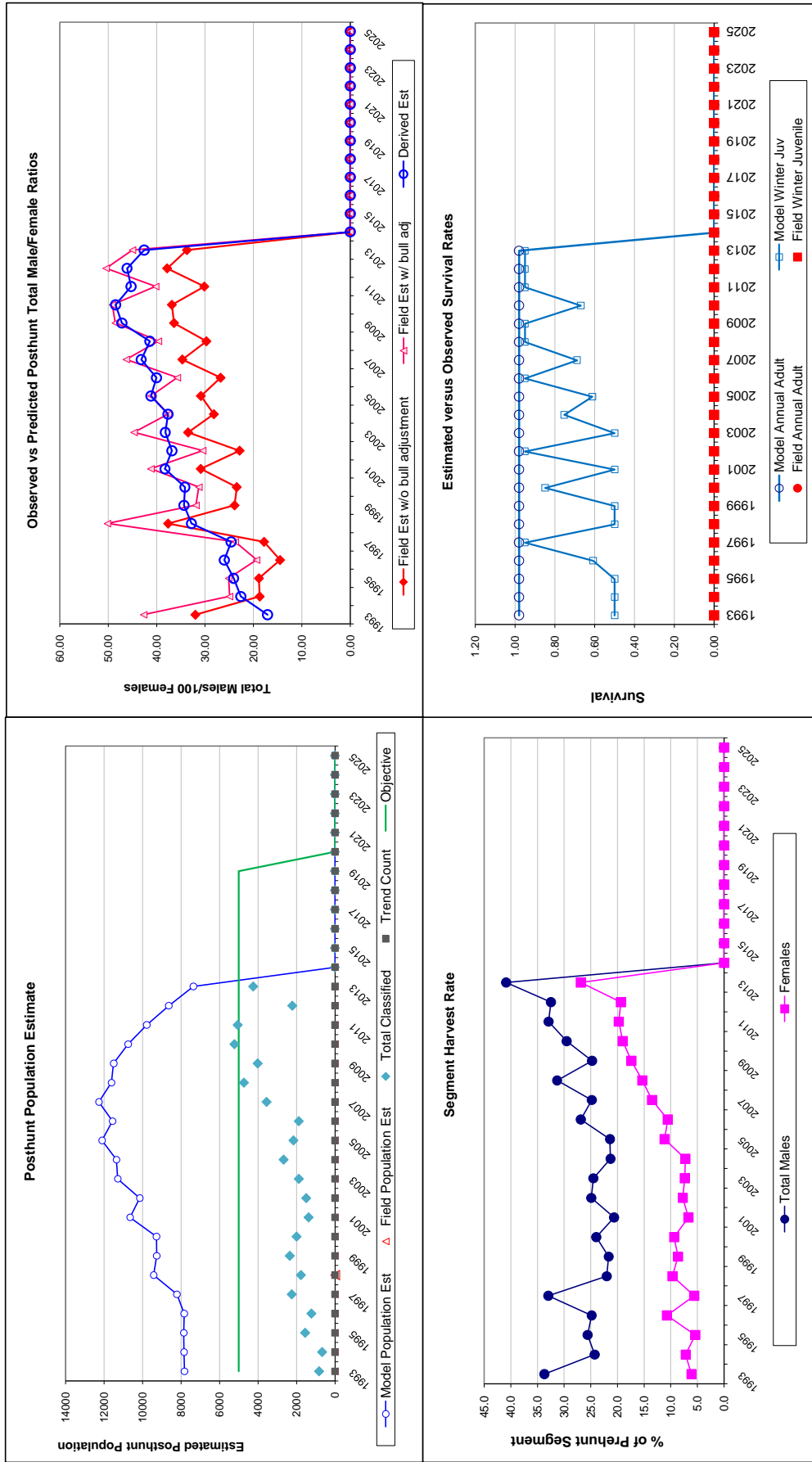
Parameters:		Optim cells
Adult Survival =		0.980
Initial Total Male Pop/10,000 =		0.077
Initial Female Pop/10,000 =		0.448

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Total Bulls Adjustment Factor	75%

Classification Counts																	Harvest			Segment Harvest Rate (% of Prehunt Segment)		
Year	Juvenile/Female Ratio			Total Male/Female Ratio				Juv	Yrl males	2+ Males	Females	Total Harvest	Total Males	Females								
	Derived Est	Field Est	Field SE	Field Est w/ bull adj	Field Est w/o bull adj	Field SE																
1993	57.60	4.57	17.09	42.70	32.03	3.12	73	105	249	266	693	33.7	6.1									
1994	45.32	4.03	22.62	24.96	18.72	2.34	68	73	235	330	706	24.3	7.2									
1995	38.58	2.33	24.11	25.18	18.88	1.51	50	50	314	252	666	25.6	5.4									
1996	42.80	2.80	26.02	19.37	14.52	1.46	65	35	328	508	936	24.8	10.7									
1997	44.40	2.15	24.64	23.78	17.83	1.23	124	42	494	263	923	33.0	5.6									
1998	47.38	2.70	32.81	50.21	37.66	2.33	121	98	342	511	1072	22.0	9.7									
1999	42.25	2.06	34.35	31.89	23.92	1.45	78	68	385	451	982	21.7	8.6									
2000	45.59	2.37	34.17	31.30	23.47	1.57	124	112	394	486	1116	24.0	9.4									
2001	50.07	3.15	38.29	41.22	30.91	2.31	67	91	421	369	948	20.6	6.7									
2002	39.15	2.43	36.85	30.51	22.89	1.75	97	71	570	440	1178	24.9	7.7									
2003	43.22	2.41	38.24	44.70	33.52	2.05	172	61	642	451	1326	24.5	7.4									
2004	43.29	2.00	37.66	37.59	28.20	1.52	110	54	528	449	1141	21.3	7.3									
2005	48.79	2.46	41.18	41.19	30.89	1.83	119	103	547	728	1497	21.4	11.2									
2006	39.56	2.21	40.04	35.75	26.81	1.73	149	54	807	693	1703	26.9	10.6									
2007	45.57	1.83	43.20	46.29	34.72	1.54	309	86	757	925	2077	24.7	13.5									
2008	44.41	1.54	41.42	39.66	29.74	1.19	296	55	1019	1032	2402	31.3	15.4									
2009	39.81	1.56	47.17	48.58	36.43	1.48	193	80	789	1179	2241	24.8	17.4									
2010	36.23	1.28	48.49	49.18	36.89	1.29	140	102	974	1245	2461	29.5	19.0									
2011	44.91	1.50	45.29	40.23	30.17	1.17	161	78	961	1152	2352	32.9	19.8									
2012	28.41	1.65	46.13	50.47	37.86	1.98	196	46	952	1081	2275	32.5	19.4									
2013	39.89	1.51	42.58	45.03	33.77	1.36	200	80	1000	1350	2630	40.9	26.9									
2014																						
2015																						
2016																						
2017																						
2018																						
2019																						
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2021																						
2022																						
2023																						
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2025																						



FIGURES



Comments:

**APPENDIX A:**  
**Tooth Age Data for Laramie Peak / Muddy Mountain Elk**

The Laramie Peak / Muddy Mountain Elk Herd Unit (Wyoming Hunt Areas 7 & 19) has historically built a reputation for superior hunting, both in terms of high bull ratios and bull quality. Bull ratios are managed under the special management criteria, with a goal of maintaining 30-40 per 100 cows. Bull quality is monitored annually using cementum annuli tooth age from a sample of hunter-harvested elk and categorical postseason classifications based on antler size.

Tooth age data from the Laramie Peak / Muddy Mountain herd have been collected in nearly all years from 1997-2012. Tooth samples are solicited from both bull and cow elk hunters, as female age data is more representative of a random sample across age classes, while bull age data is biased towards hunter preferences for more mature age classes. Sample size has varied from year to year depending upon hunter response rates. In 2012, a total of 900 “any elk” hunters and 925 antlerless elk hunters in the herd unit were solicited for tooth samples. Of those solicited, 101 returned teeth from bulls and 73 returned teeth from cows. Samples received from calf elk were removed from resulting totals so as not to skew statistics on adult age classes.

Average tooth age of sampled adult male and female elk has remained relatively stable over the past four years (see Figure 1 & 2). In 2012, the average age of female elk sampled was 5.20, and the average age of male elk was 5.44. Median age of females was 4.5 and of males was 5.5. Of those bulls sampled, 61% were age 2-5 and 36% were age 6-10. Of those cows sampled, 53% were age 2-5 and 25% were age 6-10. This disparity between harvested bull age versus harvested cow age illustrates hunter preferences for older aged bulls.

Percentage of bulls aged 6-10 has gradually increased from 2001-2012. License issuance in the herd unit has also increased over the same time period as this population grew steadily through 2007. Managers believe that population size has been gradually decreasing over the past four years, and license issuance has been maintained at a record high during the same time period.

In those same years (2009-2012), more than a third of tooth-sampled bulls were age 6-10 as overall harvest increased, indicating that older age-class bulls have been increasingly available for harvest. This contradicts observed antler class data during the same time period that shows a decline of Class II (6 points on a side or better) bulls in the herd (see Figure 3). This disparity may be due to increased selectivity of hunters for older age-class bulls, compared to the more random sample of bulls surveyed during postseason classification flights. In addition, hunters submitting teeth may be biased towards older age class bulls, as hunters who are pleased with the quality of their animals may be more likely to submit samples. Regardless, one must assume

inherent biases within this sampling scheme apply equally across years. Thus, emerging trends in mean and median ages of sampled bulls warrant discussion.

The increasingly high percentage of older age-class bull elk is a surprising trend, considering that managers believe this herd has been decreasing since 2009. License issuance has remained high, and one would expect it to become more and more difficult to find and harvest older age-class bulls in a declining population. At the same time, average tooth age of sampled cows has slowly decreased since 2007, while license issuance and season length were liberalized. This seems to corroborate the declining trend seen in the population model. Collectively, these data seem to indicate that this herd can continue support a high number of any-elk licenses and a high level of harvest without compromising bull ratios or bull quality. Any observed decline in Class II bulls during postseason classifications may be related more to environmental variables, as it is not borne out in tooth age data. Any-elk license issuance should therefore be maintained until tooth sample data show a decline in the percentage of older age-class bulls, a decline in harvest success, and/or a decline in bull ratios below special management limits.

**Figure 1.** Tooth-age data analysis for adult bull elk harvested within the Laramie Peak/Muddy Mountain Herd Unit, 1997 - 2012.

Year	Number of Adult Males per Age Class (Tooth Sampling)																
	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+	11+	12+	13+	14+	15+	16+	17+
1997	7	13	5	5	6	2	2	3	0	2	1	0	0	0	0	0	0
1998	1	16	19	10	10	4	3	2	1	2	1	0	0	0	0	0	0
1999	20	26	39	24	16	9	8	1	2	0	0	1	0	0	0	0	0
2000	22	36	41	28	24	13	6	1	3	1	1	0	0	0	0	1	0
2001	15	22	27	29	14	10	3	3	1	0	2	2	0	0	0	0	0
2004	7	8	16	19	6	10	5	3	1	0	1	0	0	0	0	0	0
2005	6	3	27	16	10	11	6	0	3	0	1	0	0	0	0	0	0
2007	1	11	24	18	12	12	8	3	0	0	1	1	0	0	0	0	0
2008	4	2	19	24	22	17	12	3	2	1	1	0	0	0	0	0	0
2010	4	3	16	27	32	27	13	2	1	2	5	1	0	0	0	0	0
2011	7	9	11	19	25	24	7	4	6	3	3	0	0	0	0	0	0
2012	2	9	9	22	22	20	9	3	4	0	1	0	0	0	0	0	0

Year	Percentages									
	1	2-5	6-10	11-12	13+	1	2-5	6-10	11-12	13+
1997	7	29	9	1	0	15%	63%	20%	2%	0%
1998	1	55	12	1	0	1%	80%	17%	1%	0%
1999	20	105	20	1	0	14%	72%	14%	1%	0%
2000	22	129	24	1	1	12%	73%	14%	1%	1%
2001	15	92	17	4	0	12%	72%	13%	3%	0%
2004	7	49	19	1	0	9%	64%	25%	1%	0%
2005	6	56	20	1	0	7%	67%	24%	1%	0%
2007	1	65	23	2	1	1%	71%	25%	2%	1%
2008	4	67	35	1	0	4%	63%	33%	1%	0%
2010	4	78	45	6	0	3%	59%	34%	5%	0%
2011	7	64	44	3	0	6%	54%	37%	3%	0%
2012	2	62	36	1	0	2%	61%	36%	1%	0%

Year	1	2-5	6-10	11-12	13+	N	Avg Age
1997	7	29	9	1	0	46	4.41
1998	1	55	12	1	0	69	4.12
1999	20	105	20	1	0	146	3.91
2000	22	129	24	1	1	177	3.99
2001	15	92	17	4	0	128	4.17
2004	7	49	19	1	0	76	4.48
2005	6	56	20	1	0	83	4.51
2007	1	65	23	2	1	92	4.58
2008	4	67	35	1	0	107	5.01
2010	4	78	45	6	0	133	5.33
2011	7	64	44	3	0	118	5.35
2012	2	62	36	1	0	101	5.44

**Figure 2.** Tooth-age data analysis for adult female elk harvested within the Laramie Peak/Muddy Mountain Herd Unit, 1997 - 2011.

Year	Number of Adult Females per Age Class (Tooth Sampling)																					
	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+	11+	12+	13+	14+	15+	16+	17+	18+	19+	20+	21+	22+
1997	8	3	5	9	5	1	1	2	1	1	3	0	0	0	0	0	0	0	0	0	0	0
1998	3	14	6	10	6	7	5	2	1	2	1	1	1	0	0	0	1	0	0	0	0	0
1999	14	22	16	20	8	8	6	7	3	1	8	3	3	1	0	0	0	0	0	0	0	1
2000	19	26	21	17	13	11	6	4	6	0	4	3	0	1	2	1	0	0	0	0	1	0
2001	11	15	24	11	15	9	10	5	4	4	3	3	0	0	0	1	0	0	0	0	0	0
2004	8	4	13	8	8	6	3	2	3	0	0	1	0	0	0	0	0	0	0	0	0	0
2005	26	14	39	34	21	14	16	15	4	6	5	5	0	4	4	0	0	1	0	0	0	0
2007	4	7	19	24	7	6	8	5	11	4	5	2	2	1	0	2	1	0	0	0	0	0
2008	8	11	14	14	17	8	11	5	3	2	1	2	3	1	0	2	1	1	0	1	0	0
2010	5	7	14	9	13	9	3	5	3	5	1	1	2	0	1	1	0	0	0	0	0	0
2011	4	4	11	10	14	6	7	6	2	1	0	0	0	0	1	2	0	0	0	0	0	0
2012	10	9	15	8	7	5	4	6	2	1	4	1	1	0	0	0	0	0	0	0	0	0

Percentages					
Year	1	2-5	6-10	11-12	13+
1997	21%	56%	15%	8%	0%
1998	5%	60%	28%	3%	3%
1999	12%	55%	21%	9%	4%
2000	14%	57%	20%	5%	4%
2001	10%	57%	28%	5%	1%
2004	14%	59%	25%	2%	0%
2005	13%	52%	26%	5%	4%
2007	4%	53%	31%	6%	6%
2008	8%	53%	28%	3%	9%
2010	6%	54%	32%	3%	5%
2011	6%	57%	32%	0%	4%
2012	14%	53%	25%	7%	1%

Year	1	2-5	6-10	11-12	13+	N	Avg Age
1997	8	22	6	3	0	39	4.38
1998	3	36	17	2	2	60	4.90
1999	14	66	25	11	5	121	5.02
2000	19	77	27	7	5	135	4.61
2001	11	65	32	6	1	115	4.84
2004	8	33	14	1	0	56	4.27
2005	26	108	55	10	9	208	5.16
2007	4	57	34	7	6	108	5.97
2008	8	56	29	3	9	105	5.71
2010	5	43	25	2	4	79	5.49
2011	4	39	22	0	3	68	5.34
2012	10	39	18	5	1	73	5.20

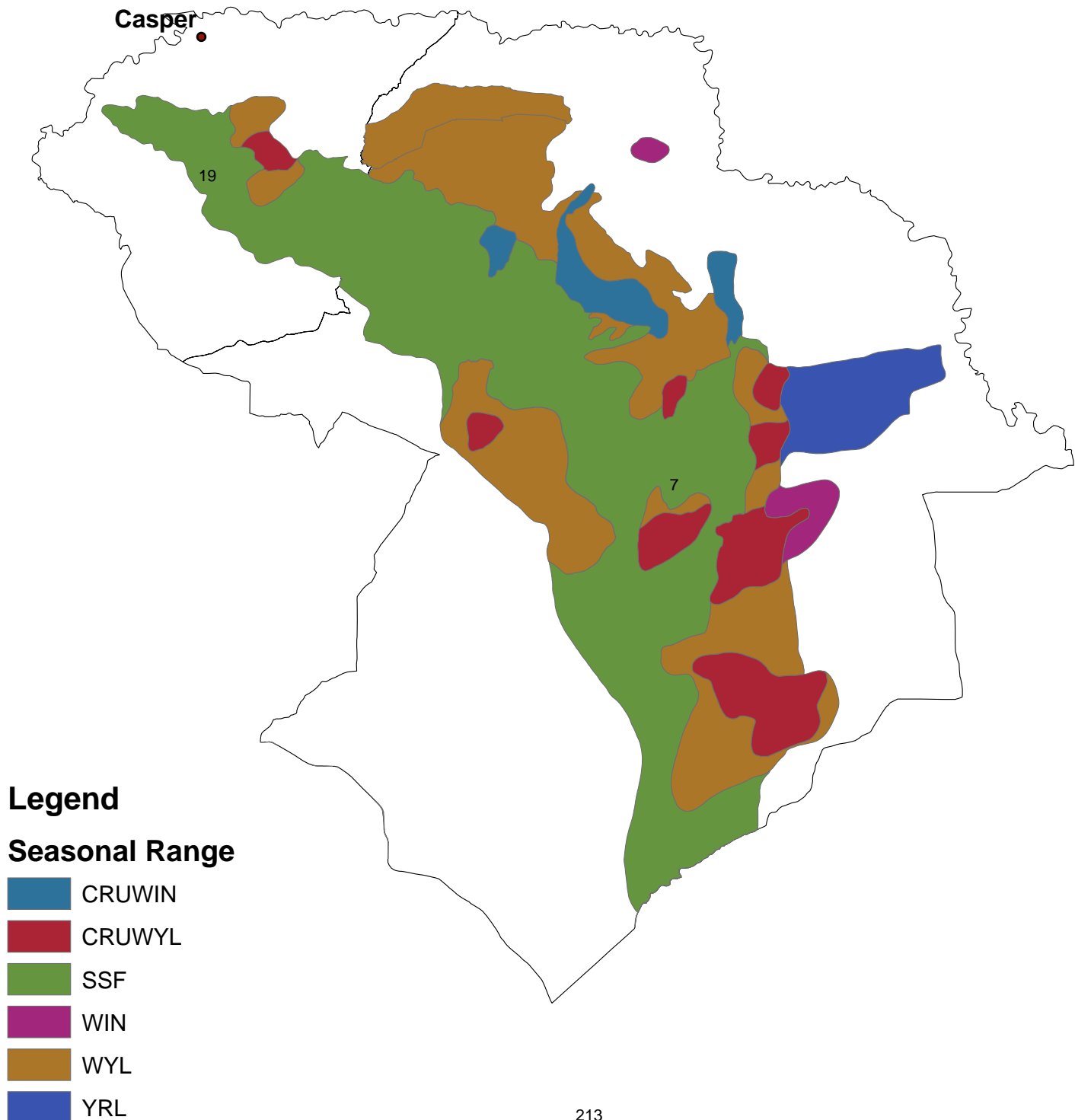
**Figure 3.** Antler classification of bull elk from the Laramie Peak/Muddy Mountain Herd Unit, 2008-2012.

<b>Mature Bull Antler Classification</b>									
Bio- Year	Area 7 (N / %)			Area 19 (N / %)			EL 741 (N / %)		
	Class I	Class II	Total	Class I	Class II	Total	Class I	Class II	Total
2008	82 (23%)	270 (77%)	352	41 (26%)	119 (74%)	160	<b>123</b> <b>(24%)</b>	<b>389</b> <b>(76%)</b>	<b>512</b>
2009	211 (49%)	219 (51%)	430	58 (41%)	84 (59%)	142	<b>269</b> <b>(47%)</b>	<b>303</b> <b>(53%)</b>	<b>572</b>
2010	246 (47%)	280 (53%)	526	61 (54%)	52 (46%)	113	<b>307</b> <b>(48%)</b>	<b>332</b> <b>(52%)</b>	<b>639</b>
2011	278 (69%)	128 (31%)	406	104 (73%)	38 (27%)	142	<b>382</b> <b>(70%)</b>	<b>166</b> <b>(30%)</b>	<b>548</b>
2012	76 (56%)	60 (44%)	136	160 (71%)	66 (29%)	226	<b>236</b> <b>(65%)</b>	<b>126</b> <b>(35%)</b>	<b>362</b>

# Laramie Peak/Muddy Mountain Elk Herd Unit (EL741)

Revised May 18, 2010

Hunt Areas 7 & 19







## 2012 - JCR Evaluation Form

SPECIES: Elk

PERIOD: 6/1/2012 - 5/31/2013

HERD: EL742 - RATTLESNAKE

HUNT AREAS: 23

PREPARED BY: HEATHER  
O'BRIEN

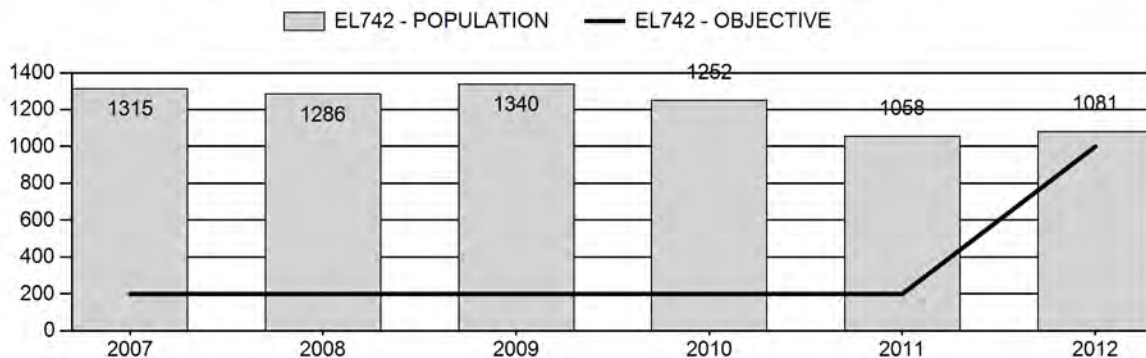
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	1,250	1,081	1,009
Harvest:	158	117	156
Hunters:	325	388	345
Hunter Success:	49%	30%	45%
Active Licenses:	348	404	390
Active License Percent:	45%	29%	40%
Recreation Days:	2,773	3,906	3,700
Days Per Animal:	17.6	33.4	23.7
Males per 100 Females	40	28	
Juveniles per 100 Females	34	38	

Population Objective: 1,000  
 Management Strategy: Recreational  
 Percent population is above (+) or below (-) objective: 8%  
 Number of years population has been + or - objective in recent trend: 22  
 Model Date: 5/6/2013

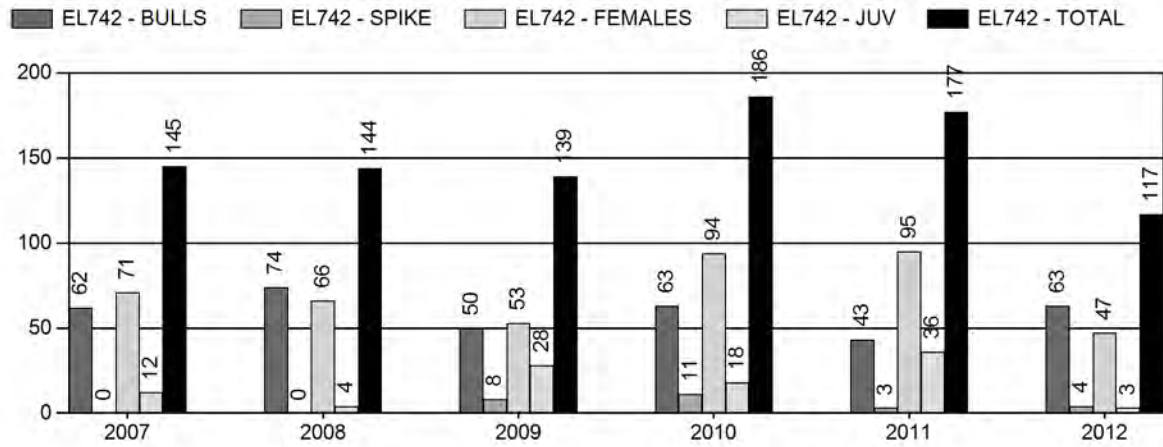
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq$ 1 year old:	7.7%	9.9%
Males $\geq$ 1 year old:	24.4%	31.6%
Juveniles (< 1 year old):	1%	6%
Total:	9.66%	13.2%
Proposed change in post-season population:	-10.6%	-14.6%

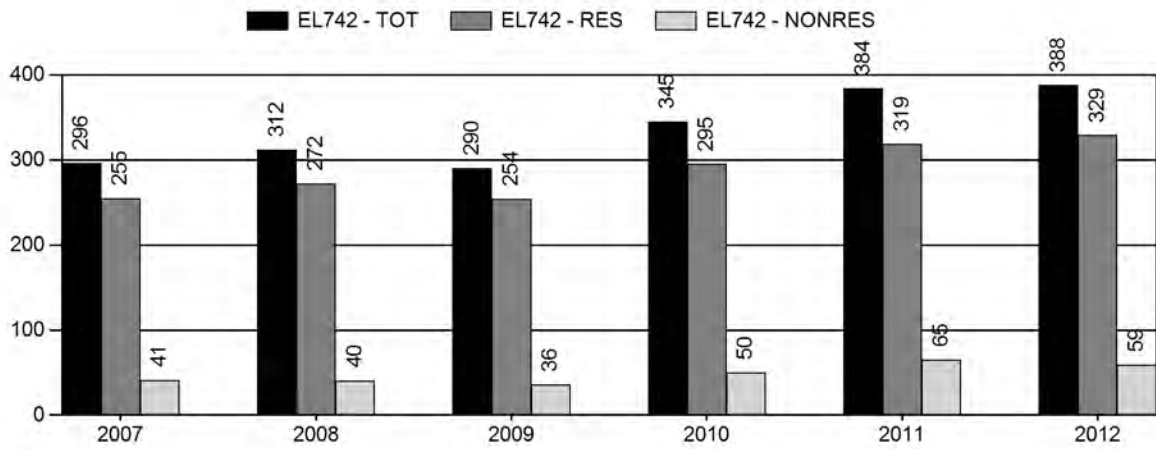
## Population Size - Postseason



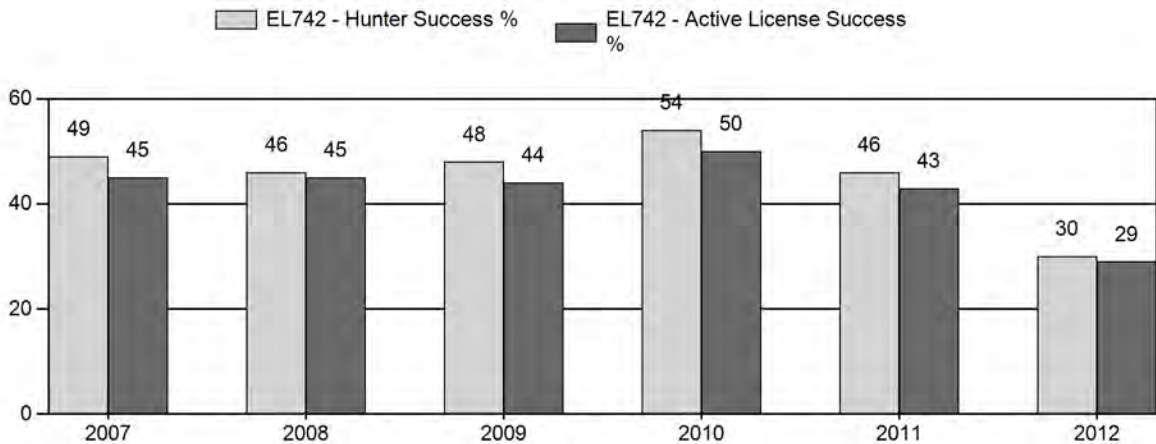
## Harvest



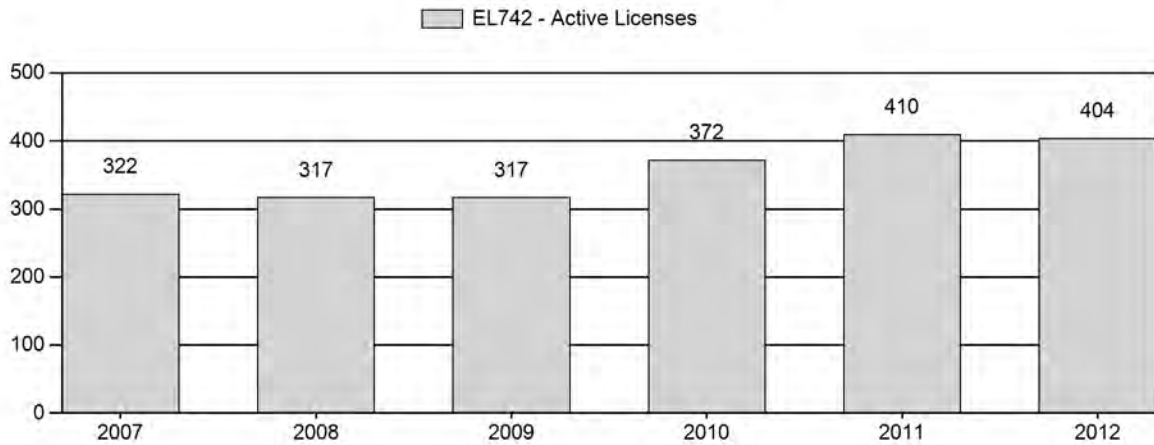
## Number of Hunters



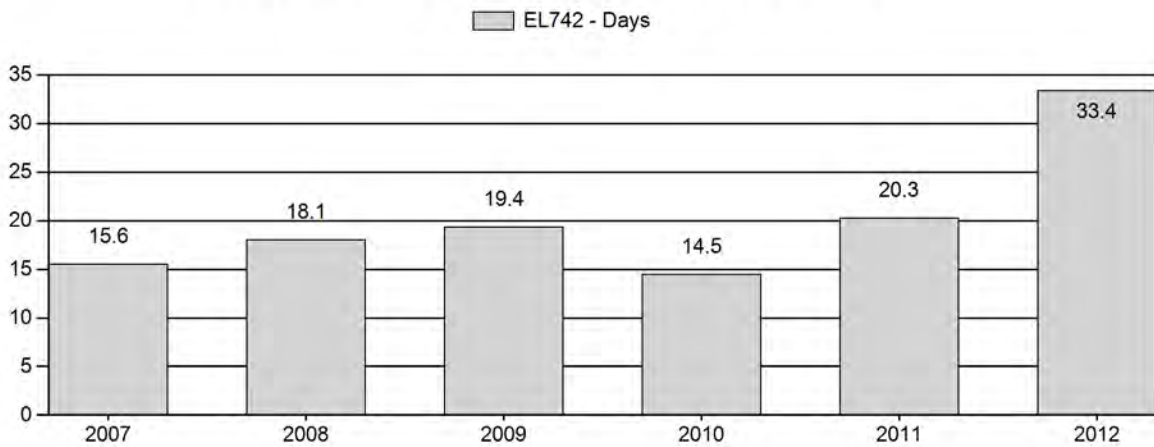
## Harvest Success



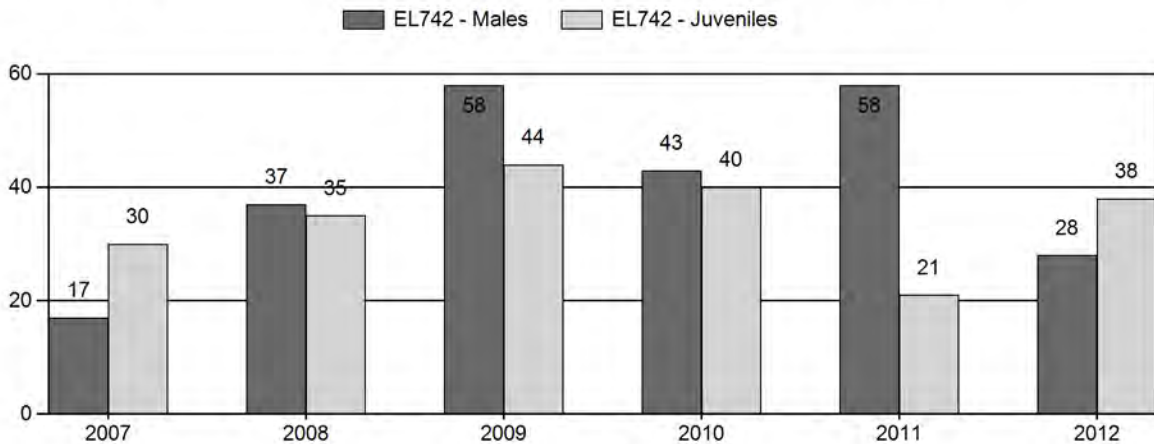
## Active Licenses



## Days per Animal Harvested



## Postseason Animals per 100 Females



**2007 - 2012 Postseason Classification Summary**

for Elk Herd EL742 - RATTLESNAKE

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	1,317	36	11	47	12%	277	68%	84	21%	408	283	13	4	17	± 3	30	± 4	26
2008	1,286	38	34	72	21%	195	58%	68	20%	335	375	19	17	37	± 6	35	± 5	25
2009	1,342	27	84	111	29%	192	49%	85	22%	388	579	14	44	58	± 7	44	± 6	28
2010	1,255	24	47	71	23%	166	55%	66	22%	303	415	14	28	43	± 7	40	± 6	28
2011	1,061	17	90	107	32%	185	56%	38	12%	330	443	9	49	58	± 7	21	± 4	13
2012	1,076	26	32	58	17%	204	60%	77	23%	339	384	13	16	28	± 4	38	± 5	29

**2013 HUNTING SEASONS  
RATTLESNAKE ELK (EL742)**

<b>Hunt Area</b>	<b>Type</b>	<b>Date of Seasons</b>		<b>Quota</b>	<b>Limitations</b>
23	1	Oct. 1	Oct. 31	125	Limited quota licenses; any elk
		Nov. 15	Dec. 15		Unused Area 23 Type 1 licenses
	4	Oct. 1	Oct. 31	125	Limited quota licenses; antlerless elk
		Nov. 15	Dec. 15		Unused Area 23 Type 4 licenses, also valid in Area 128
	6	Oct. 1	Oct. 31	200	Limited quota licenses; cow or calf
		Nov. 15	Dec. 15		Unused Area 23 Type 6 licenses, also valid in Area 128
Archery		Sept. 1	Sept. 30		Refer to license and type limitations in Section 3

Hunt Area	Type	Quota change from 2012
23	1	0
	4	0
	6	+25
	7	-25

**Management Evaluation**

**Current Postseason Population Management Objective:** 1,000

**Management Strategy:** Recreational

**2012 Postseason Population Estimate:** 1,100

**2013 Proposed Postseason Population Estimate:** 1,000

The Rattlesnake Elk Herd Unit has a postseason population management objective of 1,000 elk. The herd is managed using the recreational management strategy, with a goal of maintaining postseason bull ratios of 15-29 bulls per 100 cows. The objective and management strategy were revised in 2012 from a postseason objective of 200 to 1,000. The old objective was antiquated, unreasonable, and inadequate to meet the expectations of hunters, landowners, and managers.

## **Herd Unit Issues**

Hunting access within the herd unit is variable. The majority of occupied elk habitat is accessible for hunting via public land and hunter management area access. However, there is one ranch within the central part of occupied habitat that does not allow any access for hunting. Hunters have expressed frustration when elk take refuge in this area, as they tend to remain there due to low hunter pressure and good forage conditions. The main land use within the herd unit is traditional ranching and grazing of livestock, with isolated areas of oil and gas development. There is the potential for future mining of precious metals and rare earths in the hunt area, but current levels of activity are low. Disease outbreaks are not a concern in this herd unit.

## **Weather & Habitat**

The winter of 2011-2012 was mild with below average snow accumulations and relatively warm temperatures. The summer and fall of 2012 and early winter of 2013 were extremely dry with above average temperatures. While there are no established habitat transects to quantify shrub production or utilization trends in the herd unit, severe drought conditions in 2012 resulted in poor forage growth, poor forage quality, and a general lack of available water. The Rattlesnake Elk Herd seems to have tolerated the drought better than other big game species in the area, as elk were distributed across their normal range and calf ratios were comparable to historic averages.

## **Field Data**

Observed calf ratios are highly erratic in this herd unit due to varying survey conditions and levels of effort across years. Thus it is difficult to correlate changes in population size or make decisions regarding license issuance based on observed calf ratios. Instead managers continue to focus on maximizing cow harvest without over-saturating the area with hunter pressure. Increases in license issuance are not warranted unless access improves and there are no large areas where elk can take refuge from harvest pressure.

Observed bull ratios are also highly variable as a result of variable survey conditions and levels of effort from year to year. Since 2001, observed bull ratios have ranged from as low as 13 to as high as 58 per 100 cows. Years with low observed bull ratios were followed by years with much higher observed ratios; indicating bulls were likely missed during classification surveys in some years, or elk are immigrating/emigrating to and from adjacent hunt areas. Again, license issuance and season structure changes in this herd are not typically made based on observed bull ratios. Instead, seasons are designed to maximize cow harvest and maintain relatively good license success without overcrowding hunters.

## **Harvest Data**

License success in this herd unit is typically in the 40<sup>th</sup> percentile and is fairly consistent, indicating that opportunity has remained fairly similar across years. Hunter days per animal fluctuate from year to year, but this may be a function of changes in access due to weather and road conditions. The persistence of unattainable elk in the aforementioned private land refugia most certainly contributed to higher hunter days and lower license success in 2012. In years with more severe winter conditions, elk are often forced onto adjacent public lands where they can be more readily harvested.

## **Population**

The 2012 postseason population estimate was approximately 1,100 and decreasing. Postseason classification data and harvest data are applied to the model to predict population size and trends for this herd. No sightability or other population estimate data are currently available to further align the model. Managers are currently discussing the combination of several central Wyoming elk herds, where interchange of animals is known to occur. Modeling larger herds with less interchange should produce higher quality models that predict trends more accurately.

The “Constant Juvenile Survival – Constant Adult Survival” (CJ,CA) spreadsheet model was selected for the postseason population estimate of this herd. This population is difficult to model as it is small in size and appears to have consistent interchange with adjacent herds, thus violating the closed population assumption of the model. High variability in observed bull ratios also render this herd challenging to model. The TSJ,CA model was discarded, as it predicts population sizes that are lower than actual observed survey totals. When juvenile survival was increased in years known to have mild winter conditions, the SCJ,CA model also predicted population sizes that are lower than actual numbers of elk observed. The TSJ,CA,MSC model was not used as it does not seem applicable or necessary for this herd, which does not have elevated predation rates from large carnivores. While the CJ,CA model appears to be the best choice to represent the herd, it should be noted that this model selected for the lowest juvenile and the highest adult constraints, indicating that it is of poor quality. Managers recommend combining this with adjacent herds to account for interchange and to model a more closed population in future years.

## **Management Summary**

Opening day of hunting season in this herd is traditionally October 1<sup>st</sup>, and closing dates have differed with changing harvest goals from year to year. Season structures have also changed to include split seasons in some years in an attempt to maximize harvest. Input from hunters

following the 2012 season indicated poor bull hunting opportunity. Thus for 2013, season dates are changing from a continuous to a split season, in the hopes that a break in the season will allow time for elk to venture away from refuge areas and become accessible to harvest. The split in season will also result in a later closing date, which increases the possibility that winter weather will push elk off their refuge while the season is still open. Type 7 licenses, which were added in 2010 to target a specific area of damage, will be eliminated as they are no longer needed. Those licenses removed from the Type 7 license will be added to the Type 6 license, which is valid in the whole hunt area. Goals for 2013 are to improve access to elk by modifying season structure, increase harvest on cows, extend opportunity to hunt bulls, and improve overall harvest success.

If we attain the projected harvest of approximately 156 elk and assuming average calf ratios, this herd will maintain itself near objective. The predicted 2013 postseason population estimate for the Rattlesnake Elk Herd is approximately 1,000 animals.



INPUT	
Species:	Elk
Biologist:	Heather O'Brien
Herd Unit & No.:	Rattlesnake
Model date:	03/04/13

MODELS SUMMARY				Relative AICc	Check best model to create report	Notes
CJ,CA	Constant Juvenile & Adult Survival	Fit	366	375	<input type="checkbox"/> CJ,CA Model	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	366	375	375	<input type="checkbox"/> SCJ,SCA Mod	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	202	309	309	<input type="checkbox"/> TSJ,CA Model	
TSJ,CA,MSC	Time-Specific Juv, Constant Adult Survival, Male survival coefficient	188	307	307	<input type="checkbox"/> TSJ,CA,MSC Model	

Population Estimates from Top Model										
Year	Posthunt Population Est. Field Est	Trend Count	Predicted Prehunt Population		Predicted Posthunt Population		Total		Objective	
			Juveniles	Total Males	Females	Juveniles	Total Males	Females	Total	
1993			208	104	623	201	65	604	870	200
1994			332	114	642	327	76	631	1034	200
1995			264	156	700	263	119	680	1062	200
1996			202	182	732	200	127	710	1037	200
1997			338	175	746	335	123	716	1174	200
1998			548	204	786	543	159	755	1457	200
1999			266	292	876	258	252	790	1300	200
2000			369	311	839	337	234	749	1321	200
2001			206	314	819	182	244	757	1183	200
2002			274	284	787	252	230	736	1218	200
2003			344	289	784	333	237	742	1312	200
2004			304	315	811	294	248	761	1303	200
2005			423	317	819	415	262	798	1475	200
2006		786	312	360	886	299	295	801	1396	200
2007		544	250	364	860	237	296	782	1315	200
2008		385	267	350	826	263	288	753	1284	200
2009		858	361	328	804	330	265	745	1340	200
2010		899	302	342	813	282	260	710	1252	200
2011		1037	179	326	766	134	274	650	1058	200
2012		912	237	302	671	234	228	619	1081	1000
2013			234	282	665	217	193	599	1009	1000
2014										1000
2015										1000
2016										1000
2017										1000
2018										1000
2019										1000
2020										1000
2021										1000
2022										1000
2023										1000
2024										1000
2025										1000

Survival and Initial Population Estimates

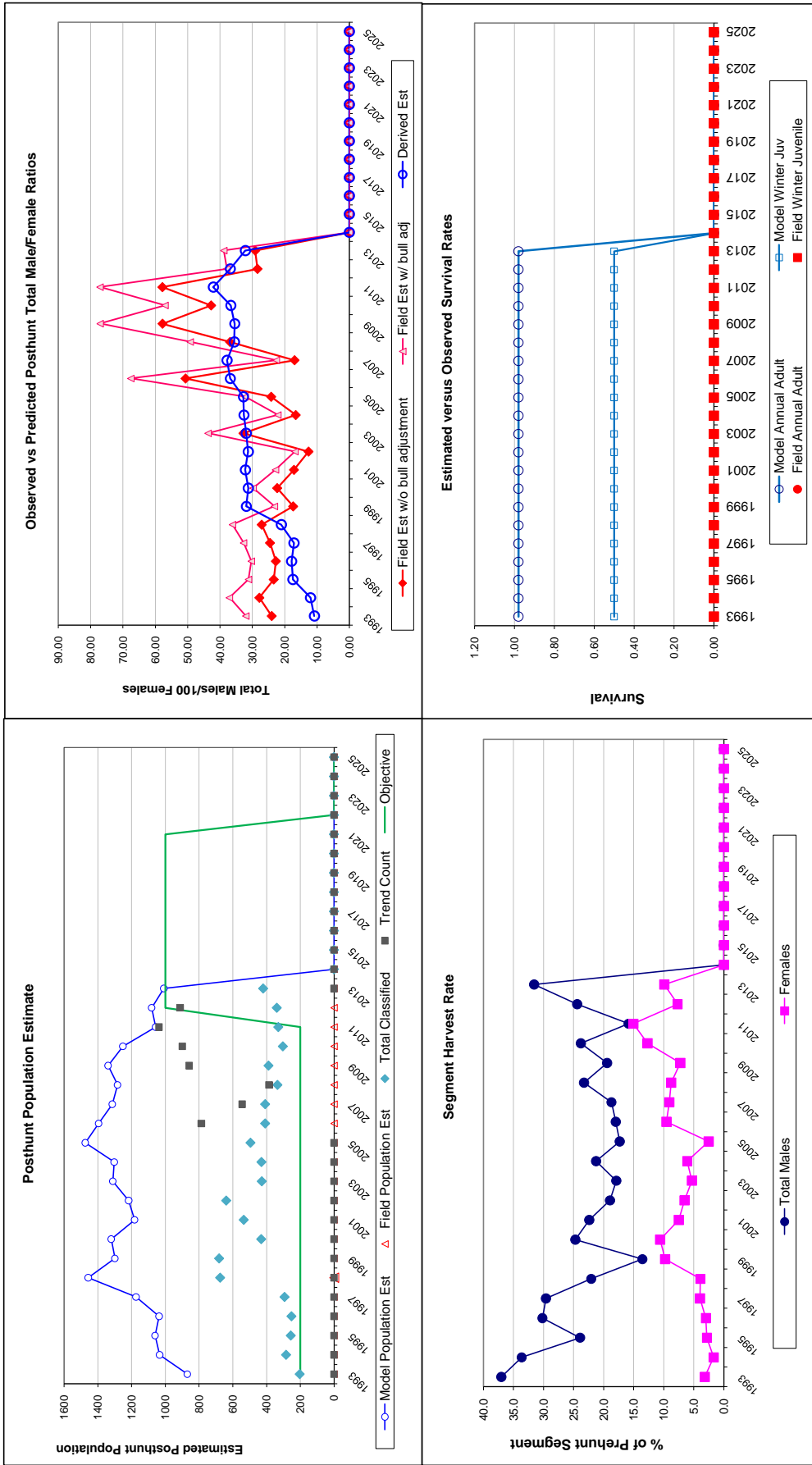
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.50		0.98	
1994	0.50		0.98	
1995	0.50		0.98	
1996	0.50		0.98	
1997	0.50		0.98	
1998	0.50		0.98	
1999	0.50		0.98	
2000	0.50		0.98	
2001	0.50		0.98	
2002	0.50		0.98	
2003	0.50		0.98	
2004	0.50		0.98	
2005	0.50		0.98	
2006	0.50		0.98	
2007	0.50		0.98	
2008	0.50		0.98	
2009	0.50		0.98	
2010	0.50		0.98	
2011	0.50		0.98	
2012	0.50		0.98	
2013	0.50		0.98	
2014	0.50		0.98	
2015	0.50		0.98	
2016	0.50		0.98	
2017	0.50		0.98	
2018	0.50		0.98	
2019	0.50		0.98	
2020	0.50		0.98	
2021	0.50		0.98	
2022	0.50		0.98	
2023	0.50		0.98	
2024	0.50		0.98	
2025	0.50		0.98	

Parameters:		Optim cells
Juvenile Survival =		0.500
Adult Survival =		0.980
Initial Total Male Pop/10,000 =		0.007
Initial Female Pop/10,000 =		0.060

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Total Bulls Adjustment Factor	75%

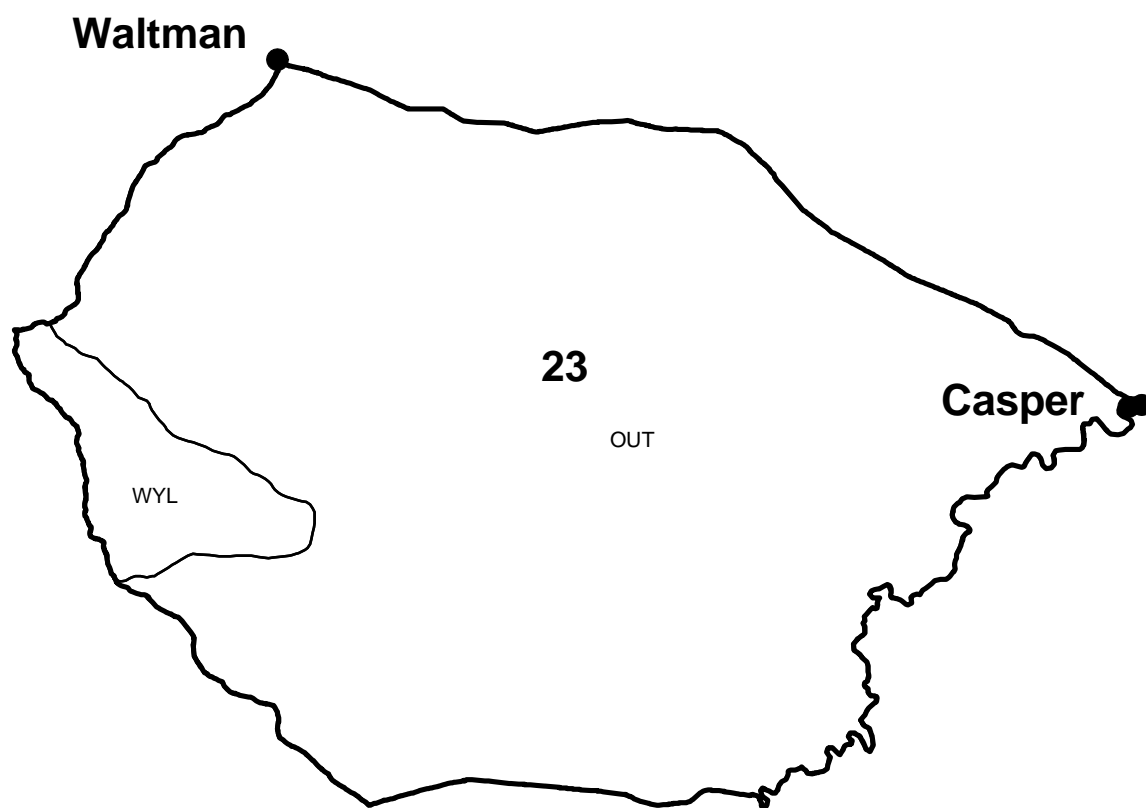
Classification Counts													
Year	Juvenile/Female Ratio			Total Male/Female Ratio			Harvest						
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/	Field Est w/o	Juv	Yrl males	2+ Males	Females	Total Harvest	Segment Harvest Rate (% of Prehunt Segment)	
					bull adj	bull adj							
1993		33.33	5.87	10.84	32.04	24.03	6	10	25	18	59	37.0	3.2
1994		51.90	7.06	12.03	37.13	27.85	4	5	30	10	49	33.7	1.7
1995		38.61	5.82	17.47	31.22	23.42	1	10	24	18	53	23.9	2.8
1996		28.14	4.65	17.90	30.34	22.75	2	13	37	20	72	30.2	3.0
1997		46.78	6.34	17.15	32.75	24.56	3	28	19	27	77	29.6	4.0
1998		71.98	6.04	21.07	36.18	27.14	4	4	37	28	73	22.1	3.9
1999		32.60	3.09	31.92	23.20	17.40	8	5	31	78	122	13.6	9.8
2000		45.00	5.03	31.29	29.79	22.34	29	0	70	81	180	24.7	10.6
2001		24.01	2.80	32.19	22.87	17.15	22	11	53	56	142	22.4	7.5
2002		34.25	3.25	31.31	16.86	12.64	20	4	45	47	116	19.0	6.6
2003		44.81	5.19	31.94	43.71	32.78	10	16	31	38	95	17.9	5.3
2004		38.63	4.40	32.64	22.14	16.61	9	6	55	45	115	21.3	6.1
2005		51.96	5.30	32.80	32.27	24.20	7	2	48	19	76	17.4	2.6
2006		37.33	4.86	36.87	67.59	50.69	12	2	57	77	148	18.0	9.6
2007		30.32	3.78	37.86	22.62	16.97	12	0	62	71	145	18.7	9.1
2008		34.87	4.91	35.60	49.23	36.92	4	0	74	66	144	23.3	8.8
2009		44.27	5.77	35.50	77.08	57.81	28	8	50	53	139	19.4	7.3
2010		39.76	5.79	36.70	57.03	42.77	18	11	63	94	186	23.8	12.7
2011		20.54	3.66	42.13	77.12	57.84	41	3	44	105	193	15.9	15.1
2012		37.75	5.05	36.87	37.91	28.43	3	4	63	47	117	24.4	7.7
2013		36.22	4.41	32.21	38.85	29.13	15	6	75	60	156	31.6	9.9
2014													
2015													
2016													
2017													
2018													
2019													
2020													
2021													
2022													
2023													
2024													
2025													

FIGURES



Comments:

Elk - Rattlesnake  
Hunt Area 23  
Casper Region  
Revised 8/94





## 2012 - JCR Evaluation Form

SPECIES: Elk

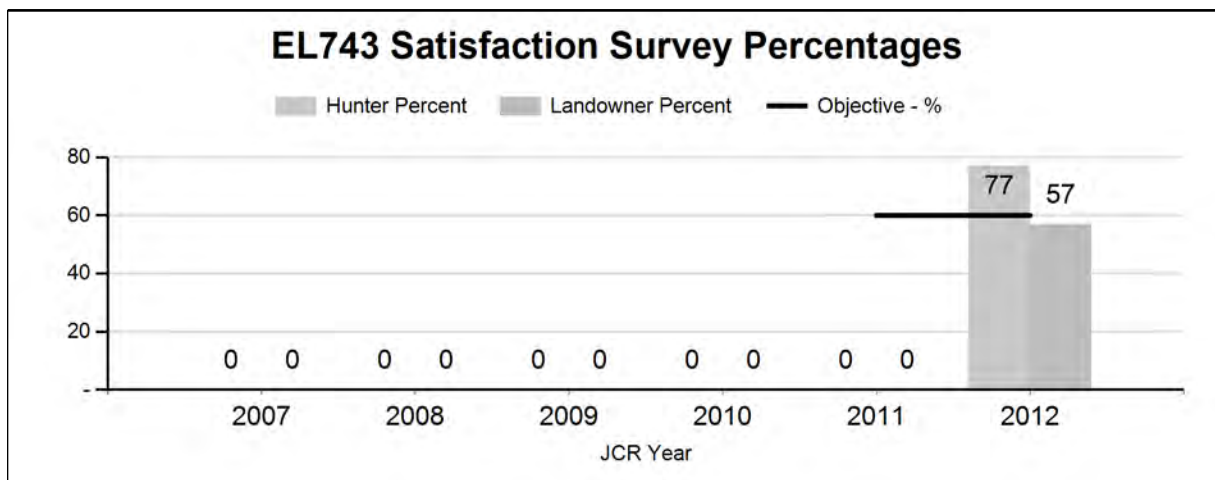
PERIOD: 6/1/2012 - 5/31/2013

HERD: EL743 - PINE RIDGE

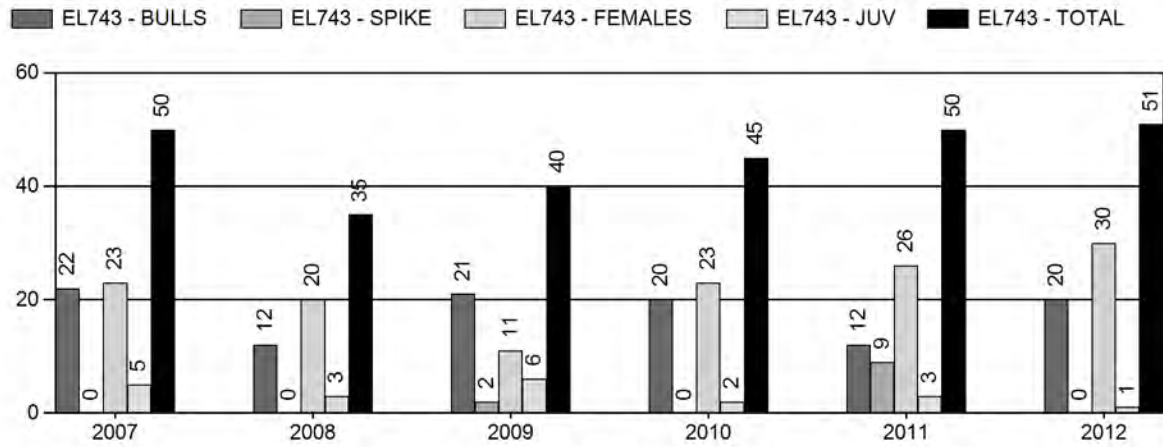
HUNT AREAS: 122

PREPARED BY: HEATHER O'BRIEN

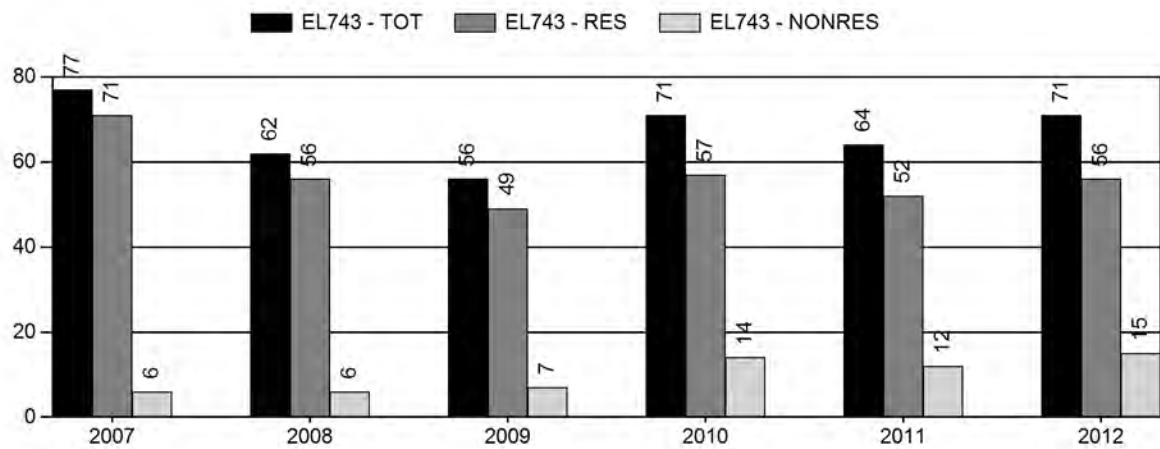
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Hunter Satisfaction Percent	0%	77%	80%
Landowner Satisfaction Percent	0%	57%	60%
Harvest:	44	51	75
Hunters:	66	71	110
Hunter Success:	67%	72%	68 %
Active Licenses:	69	67%	140
Active License Percentage:	64%	67%	54 %
Recreation Days:	323	352	550
Days Per Animal:	7.3	6.9	7.3
Males per 100 Females:	0	0	
Juveniles per 100 Females	0	0	
Satisfaction Based Objective			60%
Management Strategy:			Private
Percent population is above (+) or (-) objective:			7%
Number of years population has been + or - objective in recent trend:			1



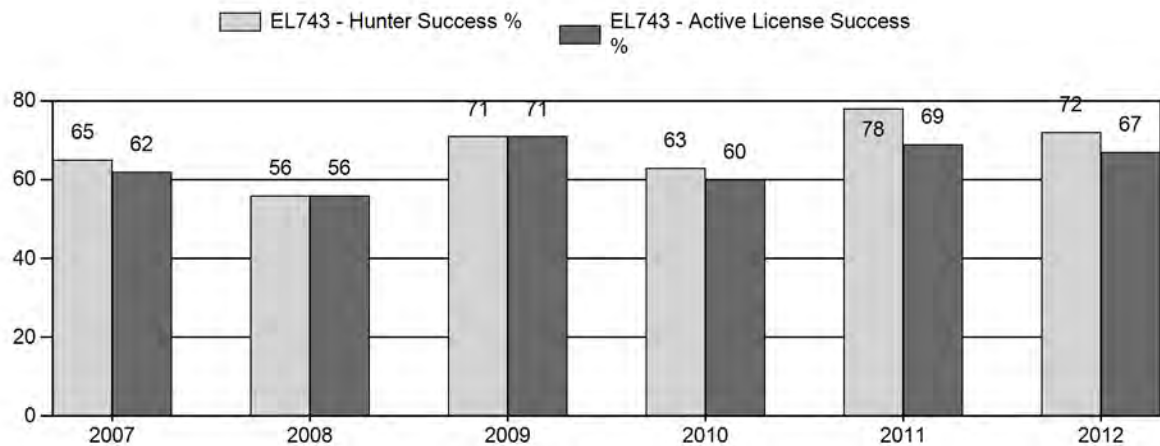
## Harvest



## Number of Hunters

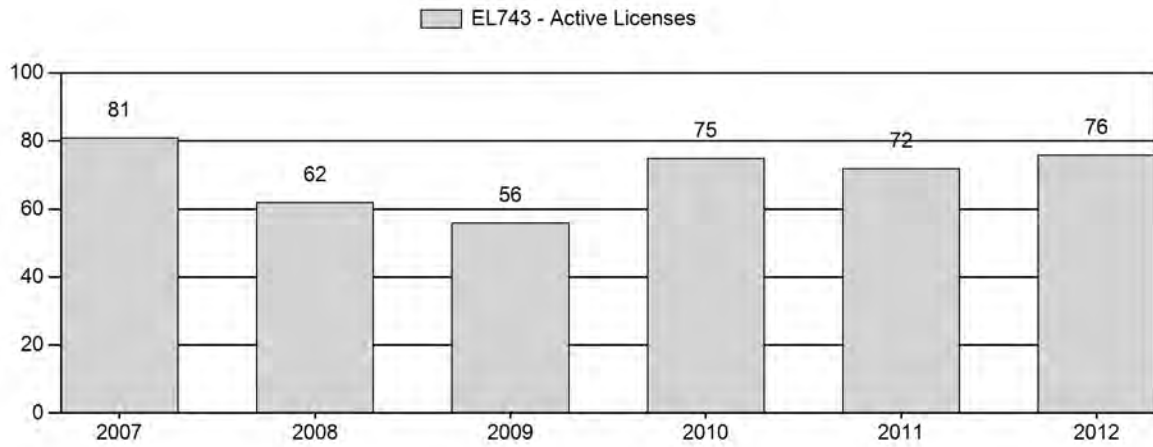


## Harvest Success

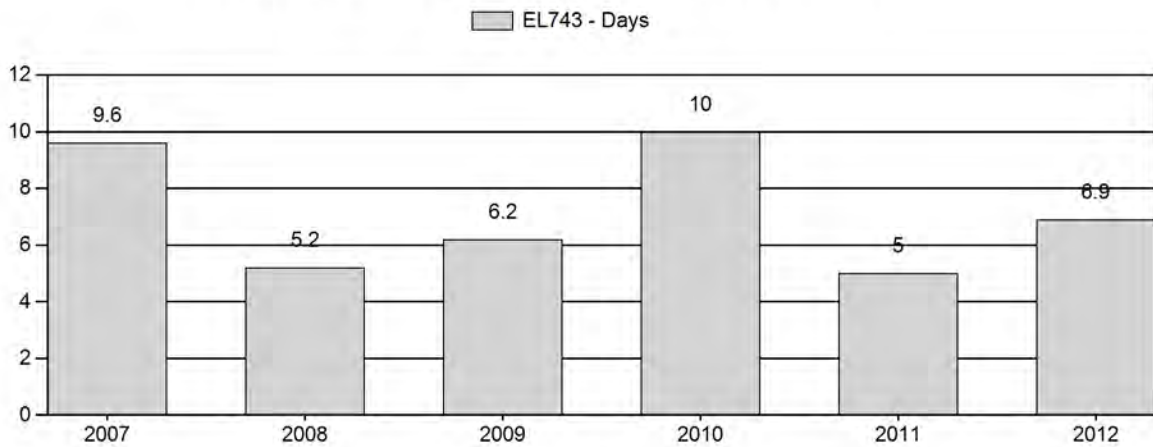




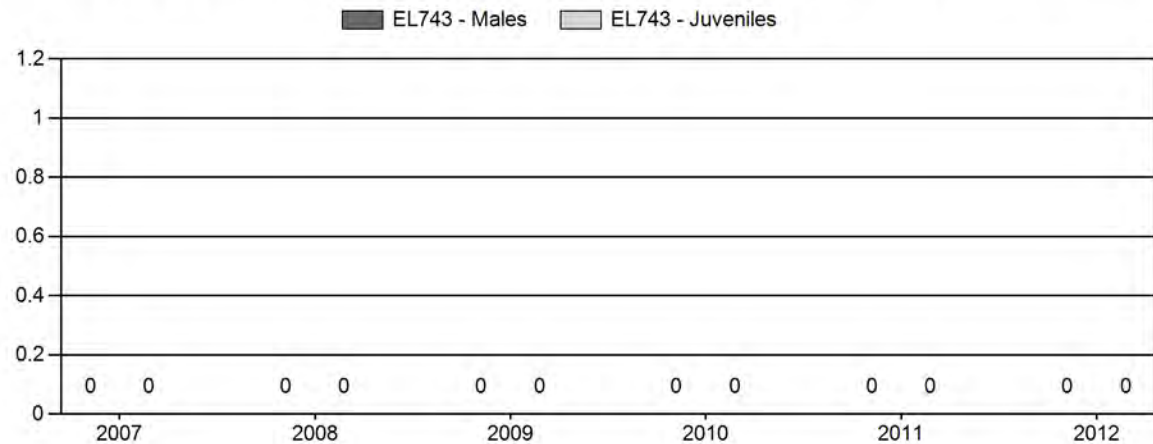
## Active Licenses



## Days per Animal Harvested



## Postseason Animals per 100 Females



**2013 HUNTING SEASONS  
PINE RIDGE ELK (EL743)**

<b>Hunt Area</b>	<b>Type</b>	<b>Date of Seasons</b>		<b>Quota</b>	<b>Limitations</b>
122	1	Oct. 15	Nov. 30	100	Limited quota licenses; any elk
		Dec. 1	Dec. 14		Unused Area 122 Type 1 licenses valid for antlerless elk
	6	Oct. 15	Dec. 14	100	Limited quota licenses; cow or calf
Archery		Sept. 1	Sept. 30		Refer to license and type limitations in Section 3

Hunt Area	Type	Quota change from 2012
122	1	+50
	6	0

**Management Evaluation**

**Current Hunter/Landowner Satisfaction Management Objective:** 60% hunter/landowner satisfaction; bull quality

**Management Strategy:** Private Land

**2012 Hunter Satisfaction Estimate:** 77%

**2012 Landowner Satisfaction Estimate:** 57%

**Most Recent 3-year Running Average Hunter Satisfaction Estimate:** NA

**Most Recent 3-year Running Average Landowner Satisfaction Estimate:** NA

The Pine Ridge Elk Herd Unit has a management objective based on 60% or higher landowner and hunter satisfaction. As a secondary objective, managers strive to maintain a bull harvest consisting of 60% mature, branch-antlered bulls. This objective was revised in 2012. An objective based upon postseason population estimates was not feasible for this herd unit.

**Herd Unit Issues**

Nearly all elk in this herd reside in and along the timbered Pine Ridge escarpment in the north central portion of the herd unit. Land use consists of traditional ranching and livestock grazing mixed with areas of intensive oil and gas, wind, and uranium development. Access to hunting is tightly controlled by private landowners, and achieving adequate harvest to manage growth of this herd is very difficult. Most landowners have historically voiced satisfaction with the number of elk on their lands within this herd, thus hunter access has remained restricted. Many

landowners that control access to elk in this herd charge high fees for bull hunting, and access for cow/calf hunting is limited such that two thirds of Type 6 licenses typically remain unsold annually.

## **Weather & Habitat**

Currently there are no habitat or classification data collected in this herd unit given the Department's minimal management influence and budgetary constraints. Instead, fixed-wing winter trend counts are conducted as budget and weather conditions allow. Previous trend counts conducted in 2009 and 2010 found a total of approximately 350 and 150 elk, respectively. A winter trend count conducted under optimum conditions in December 2012 found a total of 840 elk, indicating this herd is larger than field personnel and landowners previously believed.

## **Field Data**

Landowner and hunter satisfaction surveys are used to manage the Pine Ridge Elk Herd Unit. Survey results must show that 60% of landowners and hunters alike were either "satisfied" or "very satisfied" with the previous year's hunting season in order to justify similar seasons for the following year. A secondary objective is also used in the Pine Ridge Elk Herd Unit to anchor the results of satisfaction surveys to a population parameter. In this case, age class targets are determined from the harvest survey and used as a measure of bull quality. The percentage of mature (i.e. branch-antlered) bulls in the male portion of the annual harvest is used, with a 3-year trend average of 60% minimum being the threshold for management action. In 2013, 57% of landowners and 77% of hunters who returned surveys said they were "satisfied" or "very satisfied" with the number of elk in the Pine Ridge Elk Herd Unit, and the three-year average for mature bulls in the harvest was 86%. While hunter satisfaction and quality of harvested bulls exceeded the 60% threshold, landowner satisfaction did not. Managers are therefore tasked with making changes to the 2013 hunting season in an attempt to improve landowner satisfaction.

## **Harvest Data**

Hunter success in this herd unit is typically in the 50-70<sup>th</sup> percentile and fluctuates with access and license issuance. Hunter success has improved the last three years in a row from 63 to 80 percent, while license issuance has remained constant and antlerless elk licenses have remained undersold. Improved harvest success is likely associated with a growing number of elk in the Pine Ridge Herd, though other factors may have contributed to hunter success such as improved weather conditions for access. Despite improved hunter success, leftover antlerless licenses indicate landowner tolerance of hunters remains low while tolerance of elk remains high. Until landowners agree to provide more liberal access to antlerless elk hunters, an increase in antlerless elk license issuance is not warranted. However, several landowners have requested

an increase of Type 1 any-elk licenses for 2013. Though higher harvest of bulls will not control the continued growth of this herd, Type 1 hunters can purchase an additional Type 6 license. Managers are hopeful that encouraging this possibility with hunters will increase both bull and cow harvest in the herd unit, and that landowners will grow accustomed to a higher number hunters on their ranches.

### **Management Summary**

The elk season in this herd unit now opens on October 15<sup>th</sup> following the close of deer seasons. In more recent years, closing dates have been extended as landowners have agreed to liberalize access later in the season. The same season dates will be used for 2013, with an increase of Type 1 licenses as several landowners have expressed the desire for additional hunters. An increase of Type 6 licenses cannot be justified until access improves for antlerless hunters within the herd unit. Goals for 2013 are to increase communications with landowners to discuss options that will increase female elk harvest, to improve hunting access, and ultimately improve landowner satisfaction regarding elk numbers in this herd.

Elk - Pine Ridge  
Hunt Area 122  
Casper Region  
Revised 5/88

**Midwest**

YRL

**122**

OUT

**Casper**

**Glenrock**